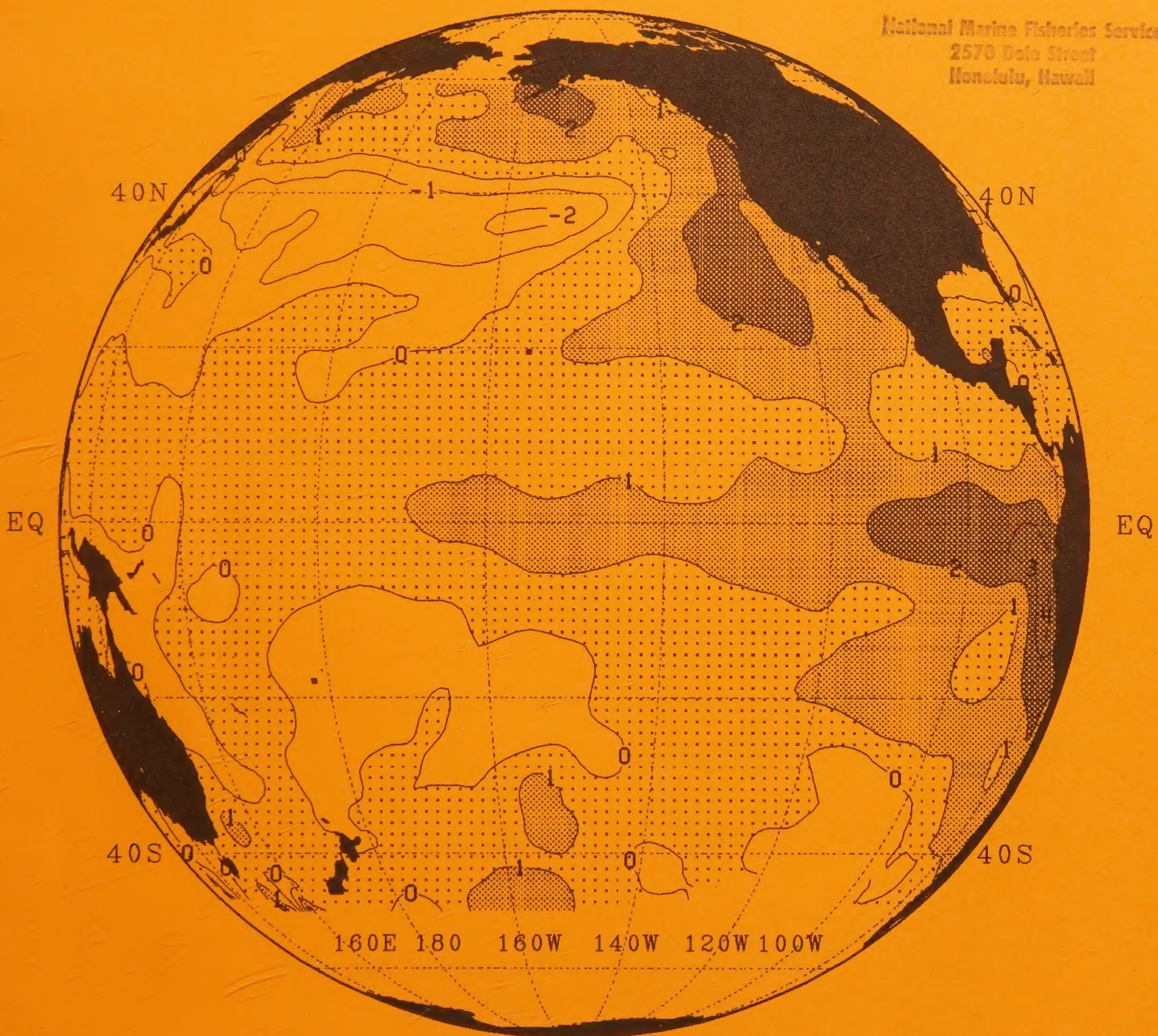
気象庁海洋月報

Monthly Ocean Report

June 1997 (No. 54)



Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成9年6月

気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成されています。
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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1997年6月の太平洋の月平均海面水温偏差図です。
陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for June 1997 in the Pacific Ocean.
Areas of positive anomalies are shaded.

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海況の特徴（１９９７年６月）

日本近海の海況

海面水温は，三陸沖と南西諸島の南で平年より1℃以上低く，日本海西部と東シナ海北部では平年より1℃以上高かった（第4図）。

黒潮は，九州から紀伊半島にかけて接岸した後，東に流れ，140°E以東では，上旬は房総半島に沿って北東に流れ，中旬は33°Nに沿って東進し，下旬は141°E付近から北に向かう流路となった（第9図）。

本州東方の親潮系の冷水は37.9°N，142.9°Eまで達していた（第5図）。

太平洋の海況

太平洋熱帯域の海面水温は，170°W以東で+1℃以上の正偏差となり，115°W以東では+2℃以上の偏差となった。また，南米沿岸には+3℃以上の正偏差域も見られた。エルニーニョ監視海域（B海域，4°N-4°S，150°W-90°W）の海面水温偏差は先月からさらに大きくなり+2℃となった。

北太平洋の海面水温は，45°N以北と140°W以東の海域で先月に引き続き平年より高かった。特にカリフォルニア沖とアラスカ沖では+2℃以上の正偏差が見られた。一方，30°Nから40°Nの150°Eから140°Wにかけて，平年より1℃以上低い海域が広がった（第16図）。

Highlights June 1997

Seas adjacent to Japan

SSTs were more than 1°C below normal off Sanriku and south of Nansei Islands. Positive SST anomalies of more than +1°C prevailed in the western part of the Japan Sea and the northern part of the East China Sea (Fig. 4).

The Kuroshio flowed along the coasts from Kyushu to Kii Peninsula, then flowed eastward. In the region east of 140°E, it flowed NE-ward along Boso Peninsula during the first 10-day of the month, eastward along 33°N during the second 10-day and northward along 141°E during the last 10-day(Fig. 9).

The Oyashio cold water extended southward to 37.9°N, 142.9°E (Fig. 5).

Pacific Ocean

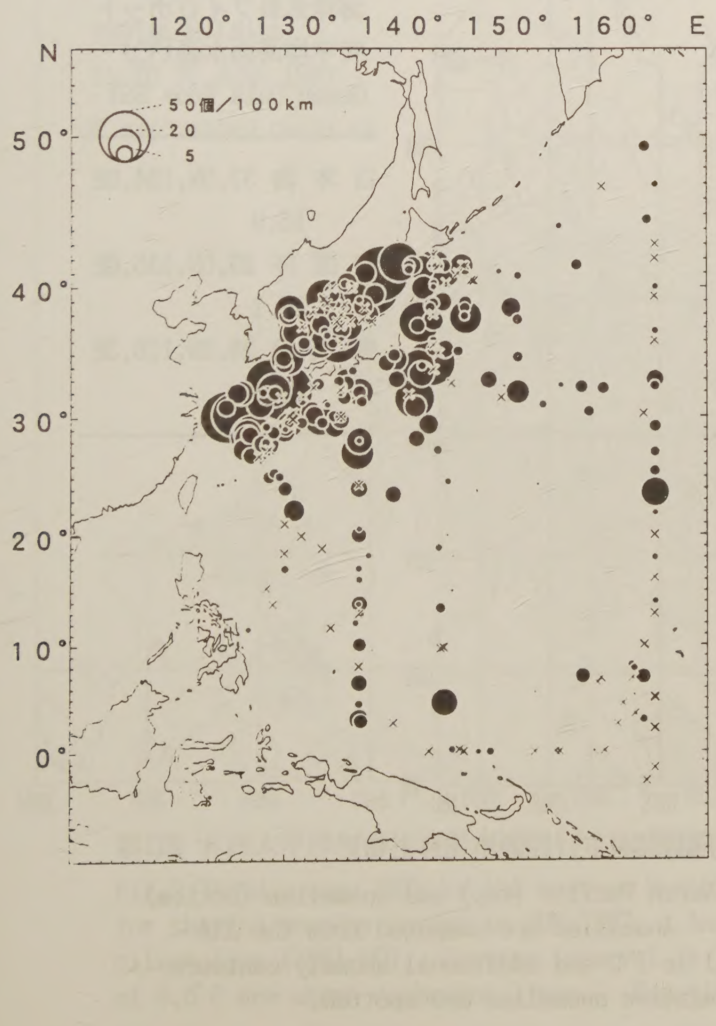
In the equatorial Pacific, SST anomalies of more than +1°C prevailed east of 170°W. SSTs were more than 2°C above normal east of 115°W, and more than 3°C above normal off the South American coast. SST anomalies for the region B (4°N-4°S, 150°W-90°W) continued to increase to +2.0°C.

In the North Pacific, positive SST anomalies continued north of 45°N and east of 140°W, with anomalies of more than +2°C found off California and Alaska. Negative SST anomalies of less than -1°C were found from 150°E to 140°W between 30°N and 40°N (Fig. 16).

1996年の海洋バックグランド汚染観測
Marine pollution monitoring in 1996

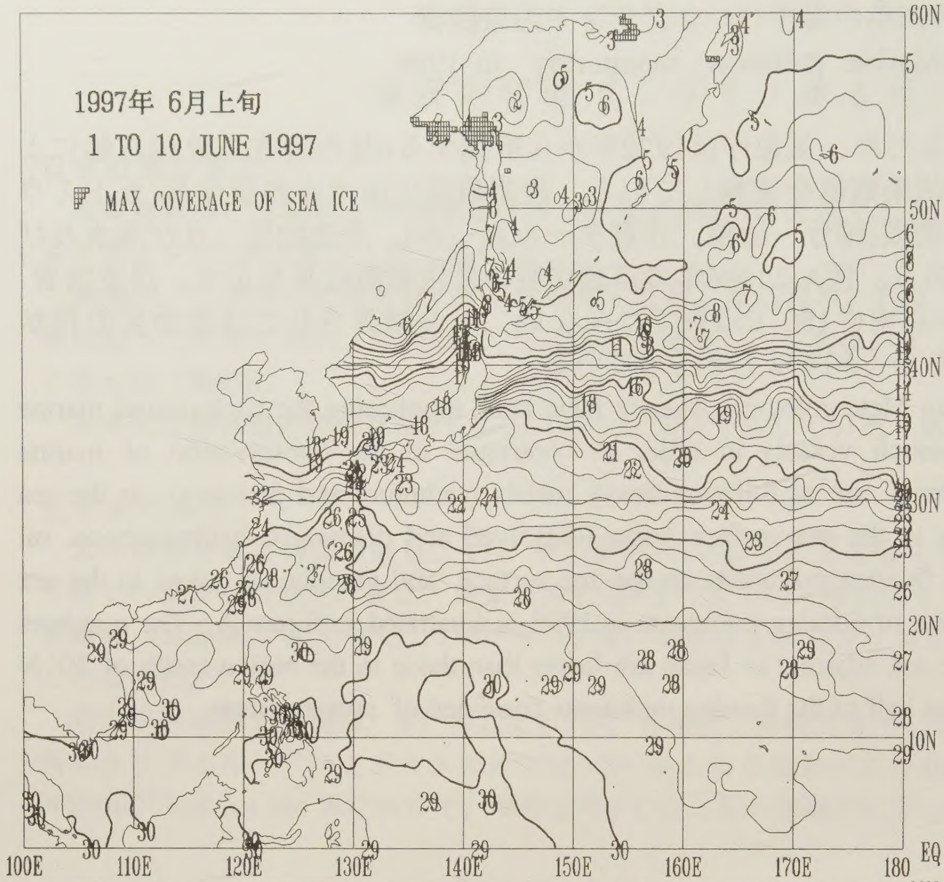
海洋環境の保全に資するため、気象庁は1972年から所属する6隻の海洋気象観測船による海洋バックグラウンド汚染観測を実施している。観測項目は海水中の重金属(カドミウム、水銀)、海面の油汚染物質(油分、油膜、浮遊タールボール)、浮遊物質、及び海水及び大気中の温室効果気体である。図Aに1996年の浮遊物質の目視観測結果を示す。浮遊物質は日本近海で多く、20°N以南や150°E以東では少ない。なお観測された浮遊物質の種類は、発泡スチロールが最も多く50%以上を占めている。

Since 1972, the Japan Meteorological Agency have been monitoring the background marine pollution on board six research vessels in order to contribute to the conservation of marine environment. Monitoring items are as follows: heavy metals (cadmium and mercury) in the sea water, petroleum pollutants in the sea surface water (dissolved and dispersive hydrocarbons, oil slicks and floating tarballs), floating pollutants on the sea surface and greenhouse gases in the sea water and the air. Distribution of floating pollutants in 1996 is illuatrated in figure A. The numbers of pollutants observed in the sea adjacent to Japan are larger than those in the region south of 20°N and east of 150°E. More than half of the floating pollutants consisted of styrene foam.

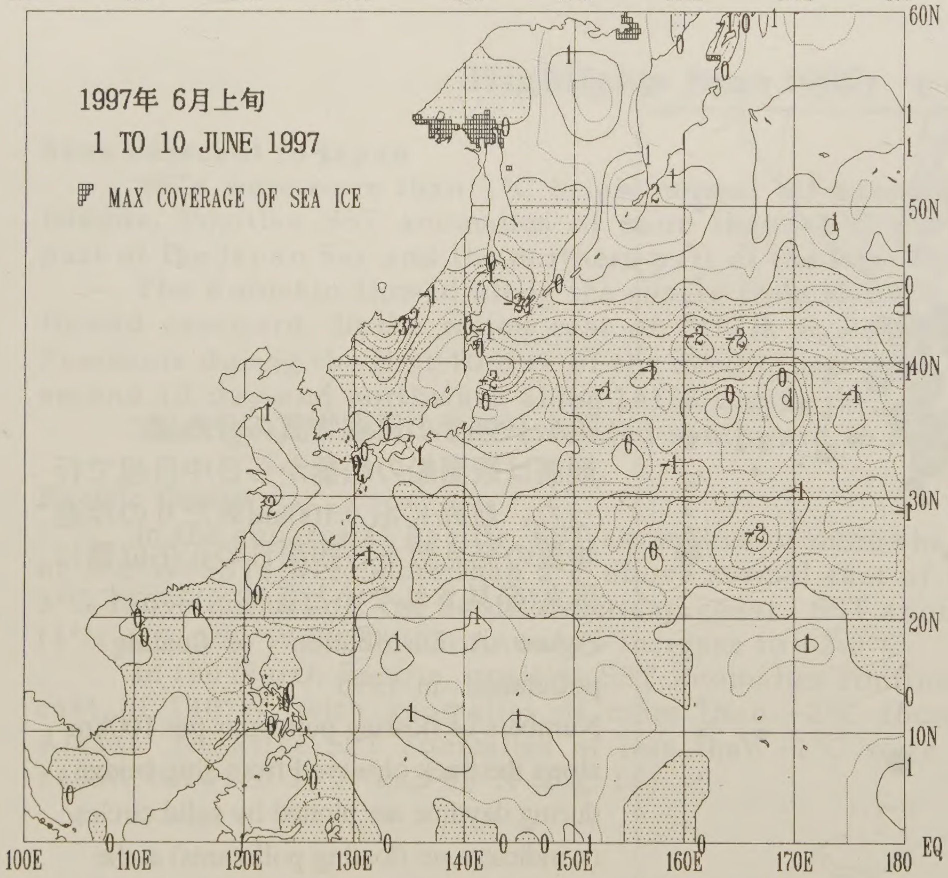


図A 1996年の浮遊物質の分布図
観測は観測船の船橋から日中目視で行った。航路に沿う100kmあたりの浮遊物質の発見数を各観測日の正午位置に黒丸(発見されないときは×)で示す。

Figure A Distribution of floating pollutants in 1996
Numbers of floating pollutants per 100km along the track observed from ship bridge during daytime are plotted by solid circles (x indicates no floating pollutants) at the noon position of each day of observation.



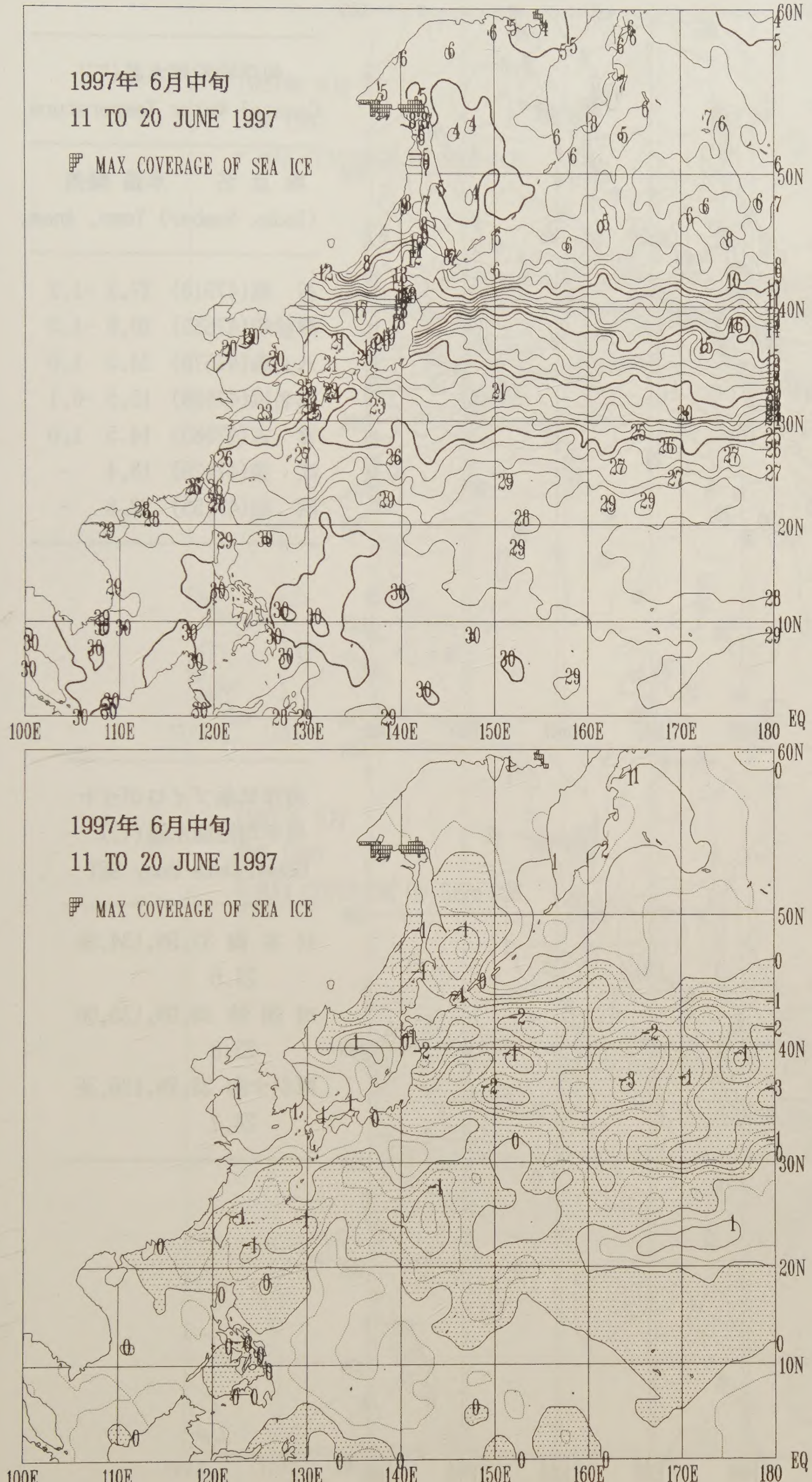
旬平均沿岸水温(℃) Coastal Water Temperature		
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石 垣(47918)	26.8	-0.1
御前崎(47655)	19.4	-1.4
八丈島(47678)	23.5	1.4
小名浜(47598)	14.7	0.3
宮 古(47585)	12.2	0.8
江 差(47428)	13.6	-
浜 田(47755)	20.6	-



海洋気象ブイロボット 旬平均海面水温(℃) Ocean Data Buoy SST	
日本海 37.9N,134.5E	16.9
四国沖 29.0N,135.0E	23.2
東シナ海 28.2N,126.3E	23.5

第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 6月上旬)

Fig.1 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 1st ten-day period in JUN 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

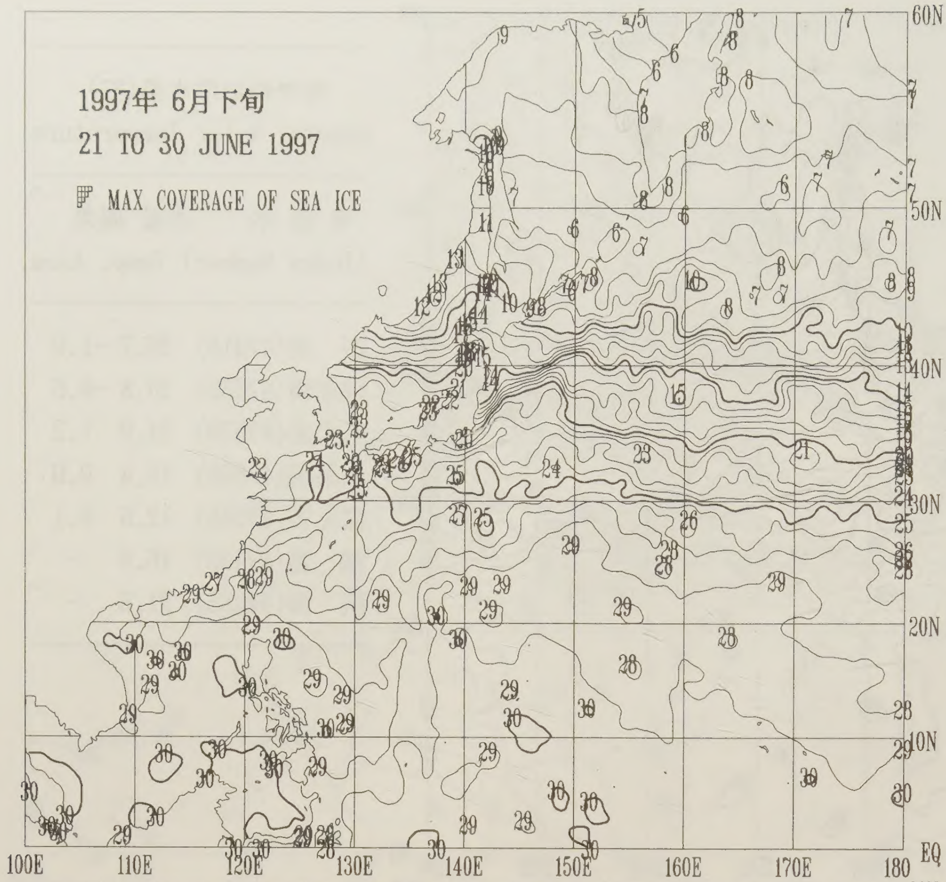
地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	26.7	-1.0
御前崎(47655)	20.8	-0.6
八丈島(47678)	24.0	1.2
小名浜(47598)	15.4	0.9
宮　古(47585)	12.5	0.1
江　差(47428)	16.0	-
浜　田(47755)	21.5	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

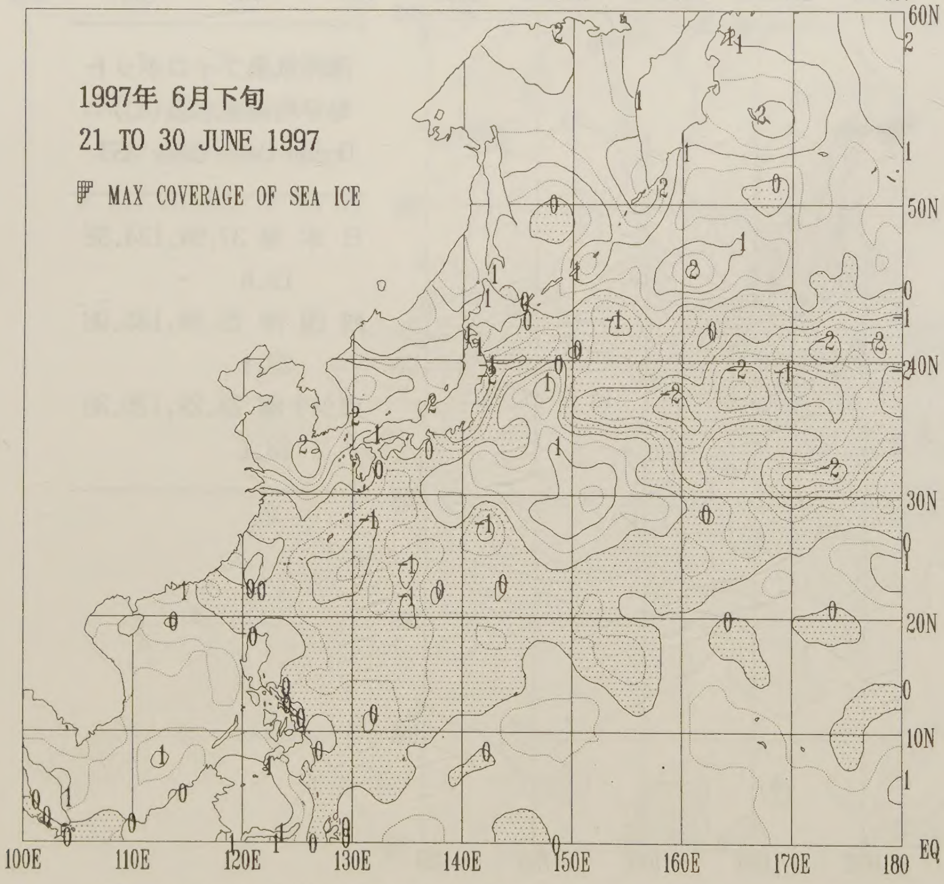
日 本 海	37.9N,134.5E	19.8
四 国 沖	29.0N,135.0E	23.1
東シナ海	28.2N,126.3E	23.1

第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 6月中旬)

Fig.2 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 2nd ten-day period in JUN 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃) Coastal Water Temperature		
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	27.3	-1.2
御前崎(47655)	20.6	-1.3
八丈島(47678)	24.5	1.0
小名浜(47598)	15.5	-0.1
宮　古(47585)	14.5	1.0
江　差(47428)	18.4	-
浜　田(47755)	22.8	-

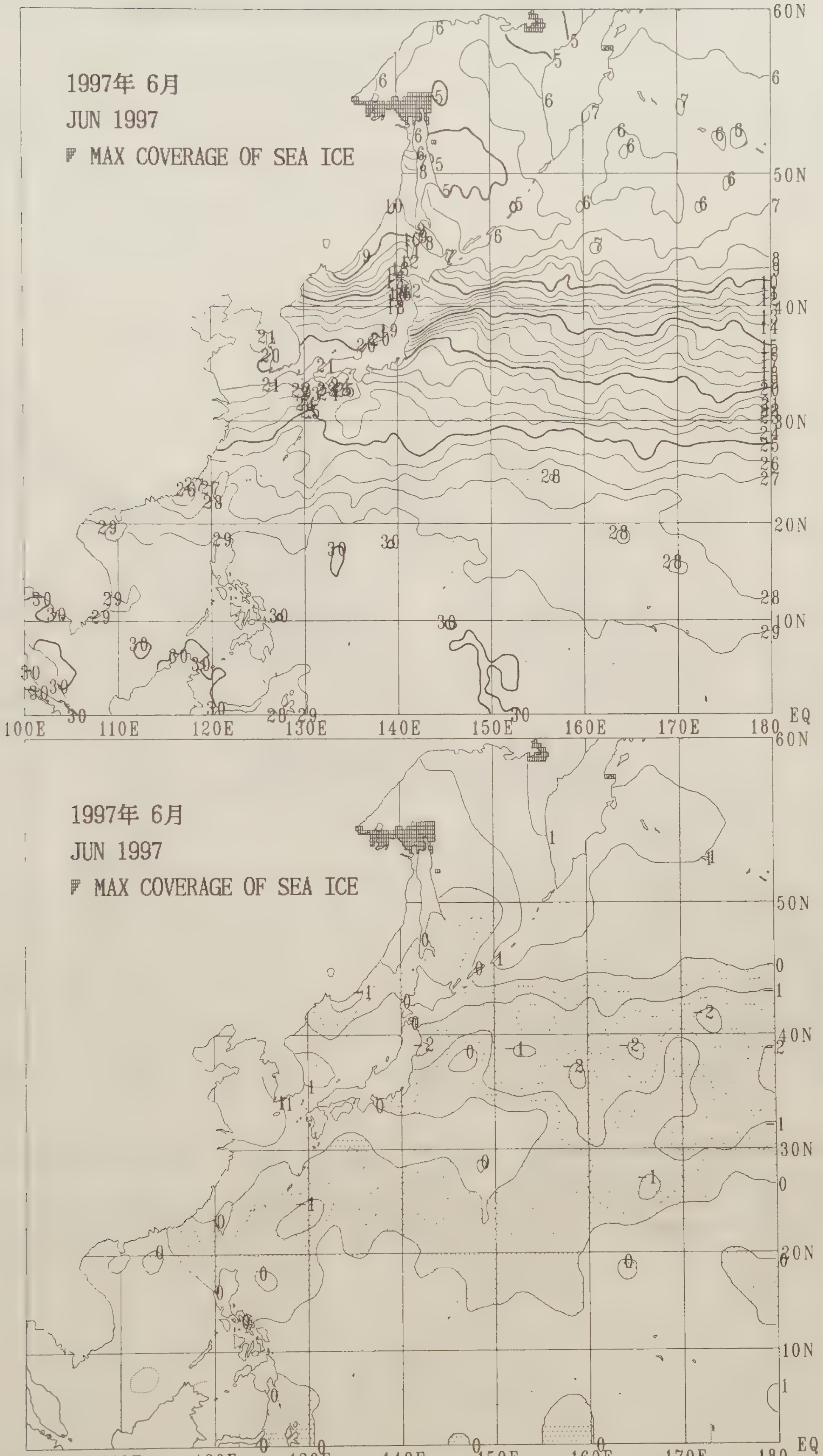


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海 37.9N,134.5E	21.6
四国沖 29.0N,135.0E	23.8
東シナ海 28.2N,126.3E	24.7

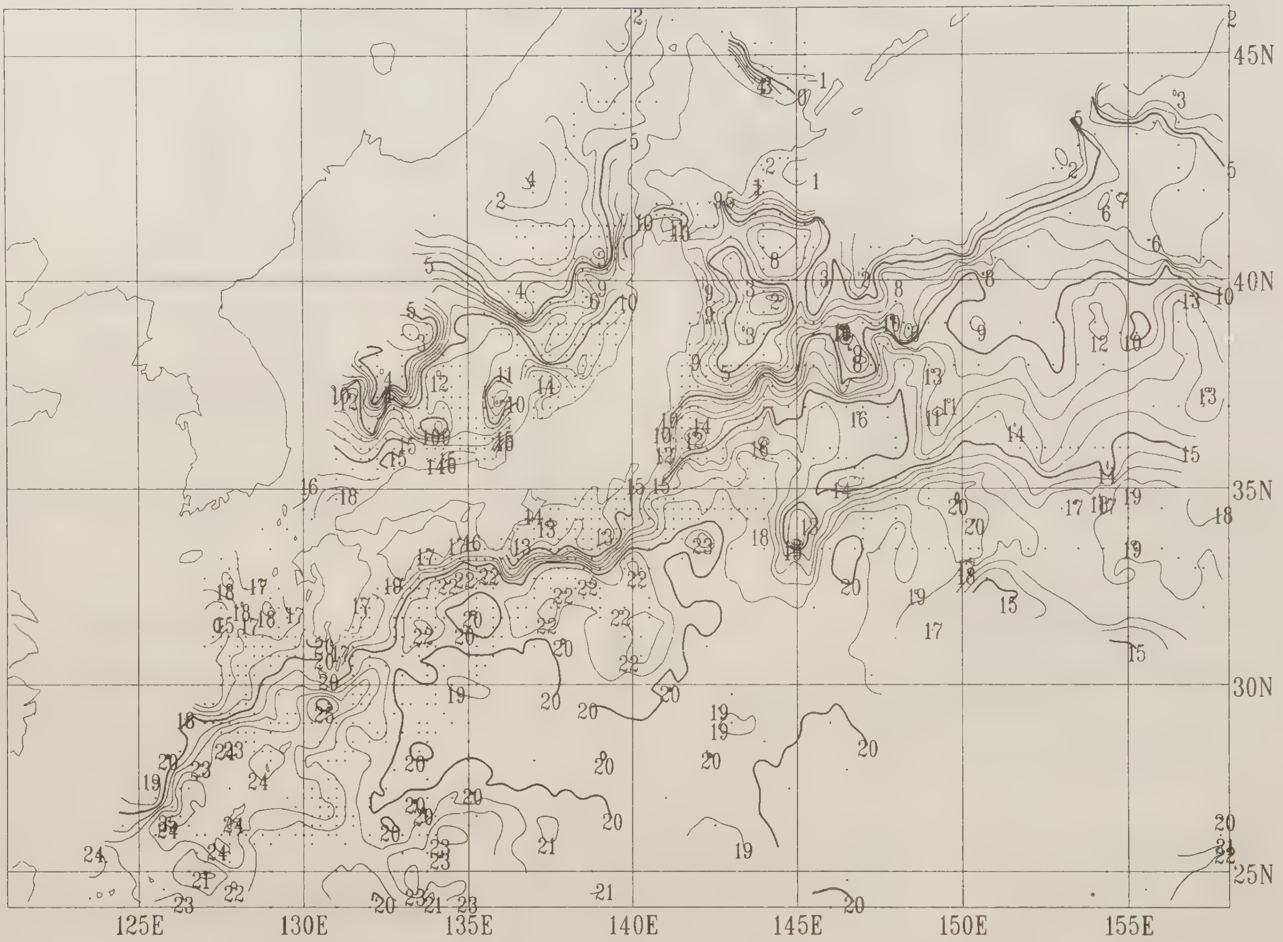
第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 6月下旬)

Fig.3 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 3rd ten-day period in JUN 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.



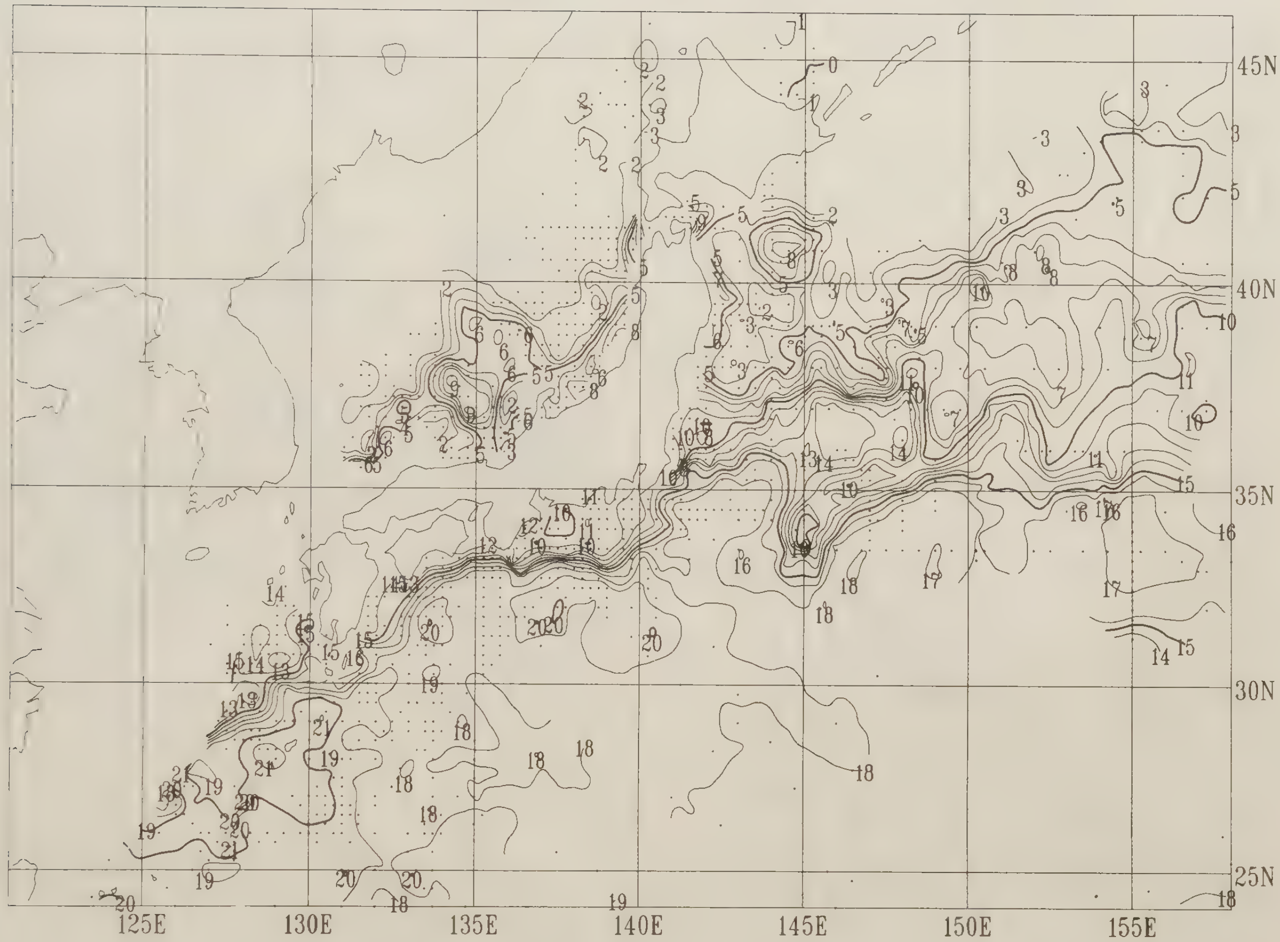
第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1997年 6月)

Fig.4 Monthly mean SSTs in the western North Pacific (top) and anomalies (bottom) for JUN 1997. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.



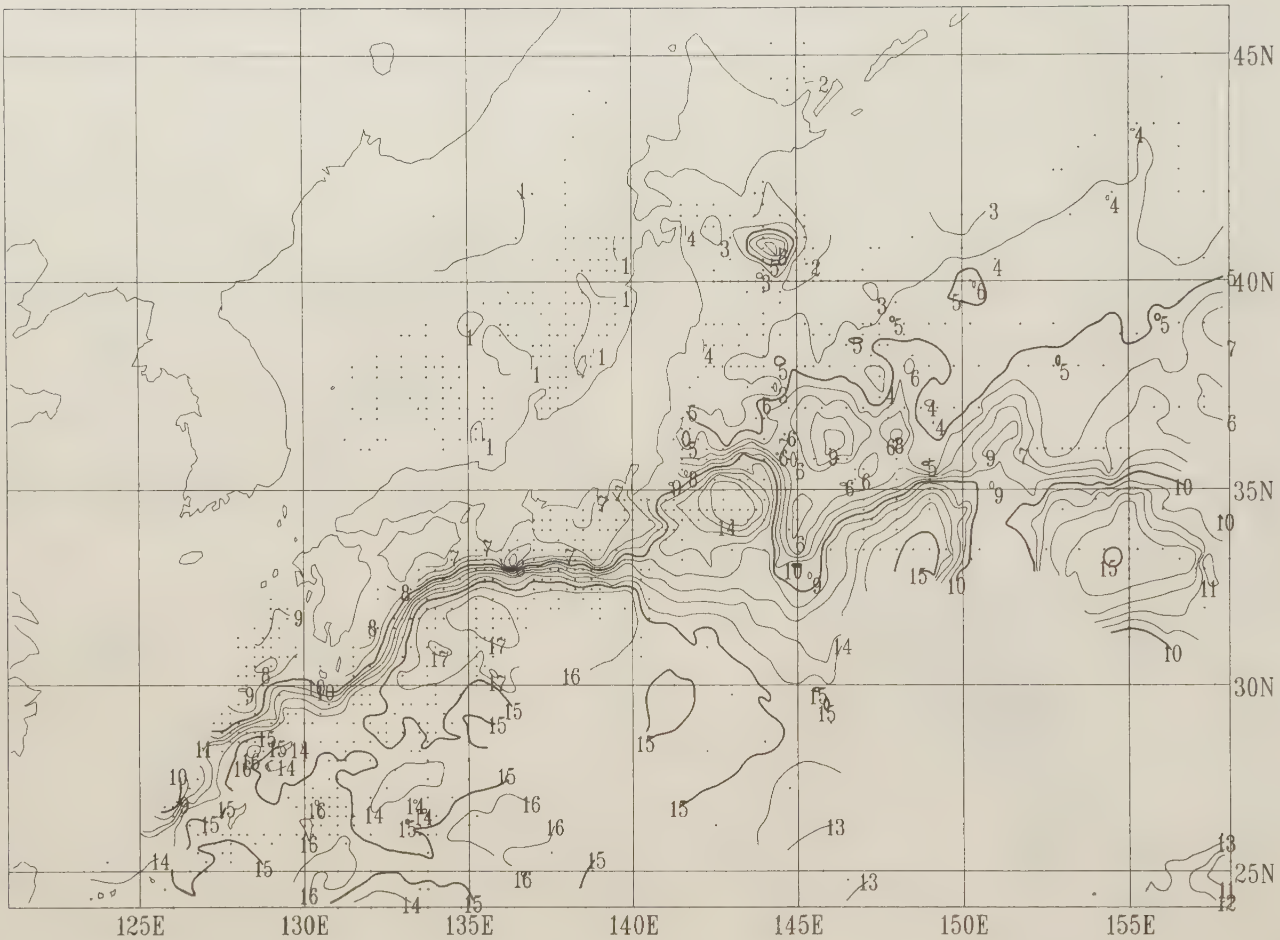
第5図　日本近海表層水温(深さ100m)図 (1997年 6月)

Fig.5 Subsurface (100m) temperatures in the seas adjacent to Japan for JUN 1997. Contour interval is 1°C. Observation points are denoted by dots.



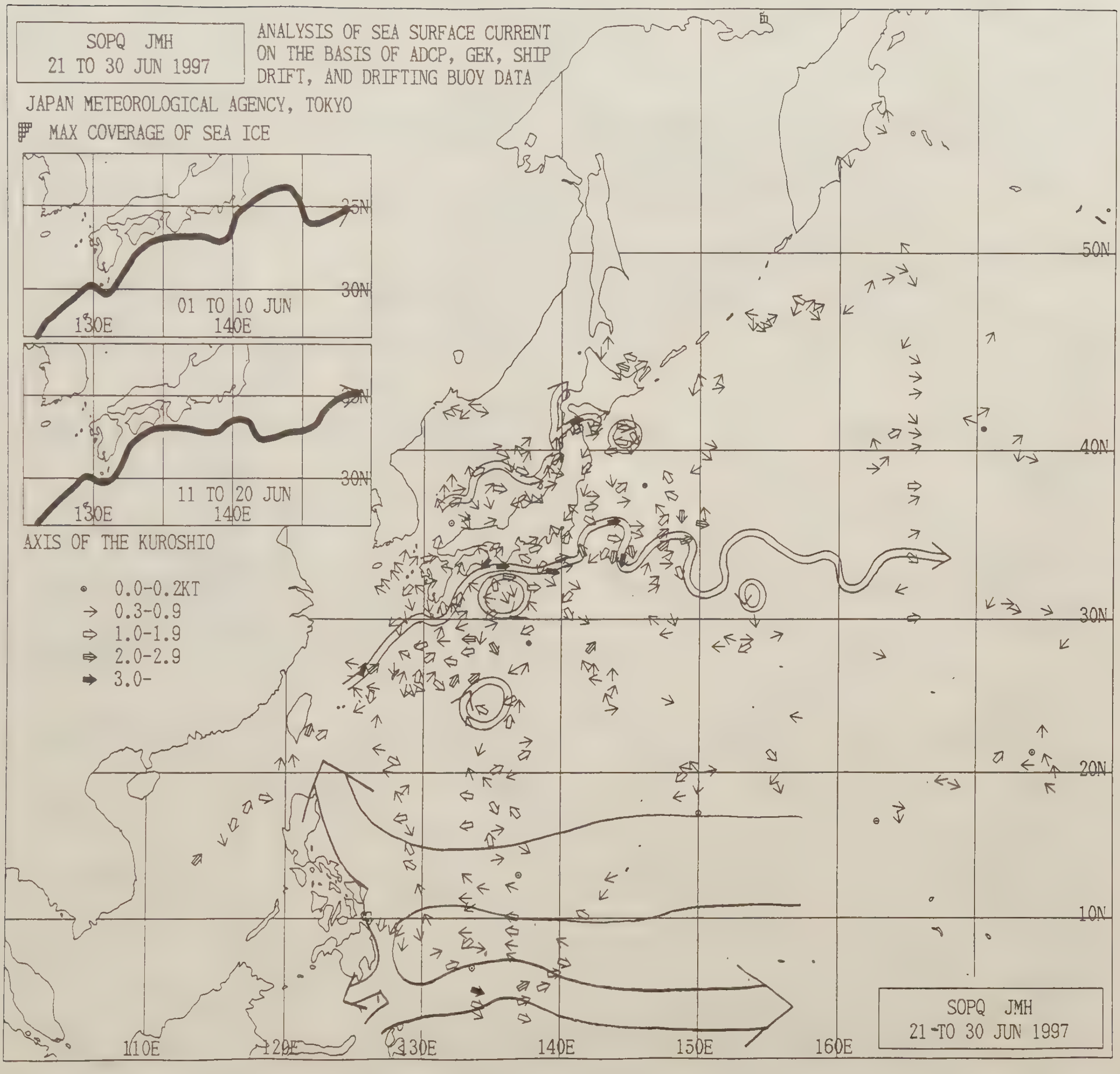
第6図　日本近海表層水温(深さ200m)図 (1997年 6月)

Fig.6　Subsurface (200m) temperatures in the seas adjacent to Japan for JUN 1997.　Contour interval is 1°C.　Observation points are denoted by dots.



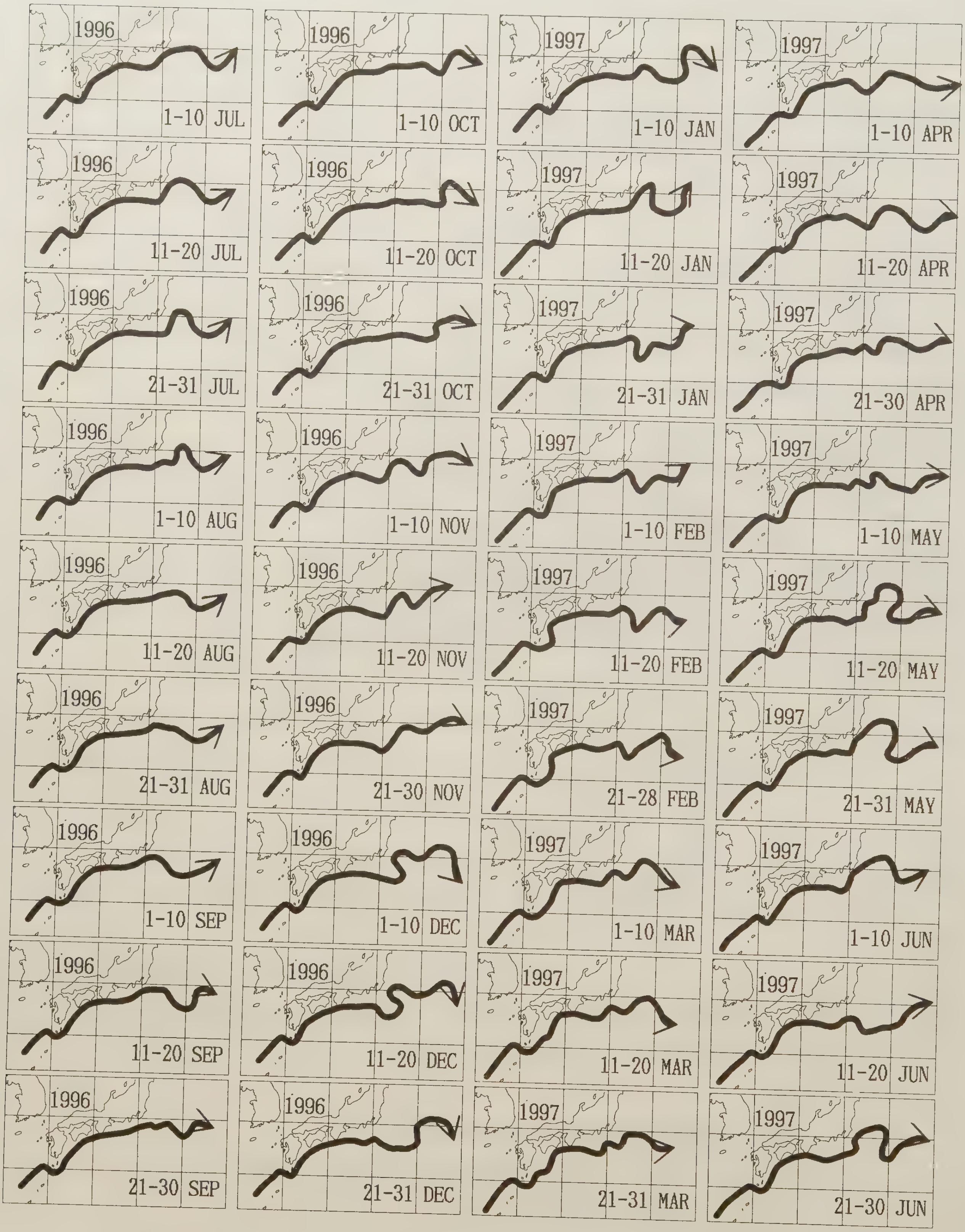
第7図　日本近海表層水温(深さ400m)図 (1997年 6月)

Fig.7 Subsurface (400m) temperatures in the seas adjacent to Japan for JUN 1997. Contour interval is 1°C. Observation points are denoted by dots.



第8図　北西太平洋海流図（1997年 6月下旬）

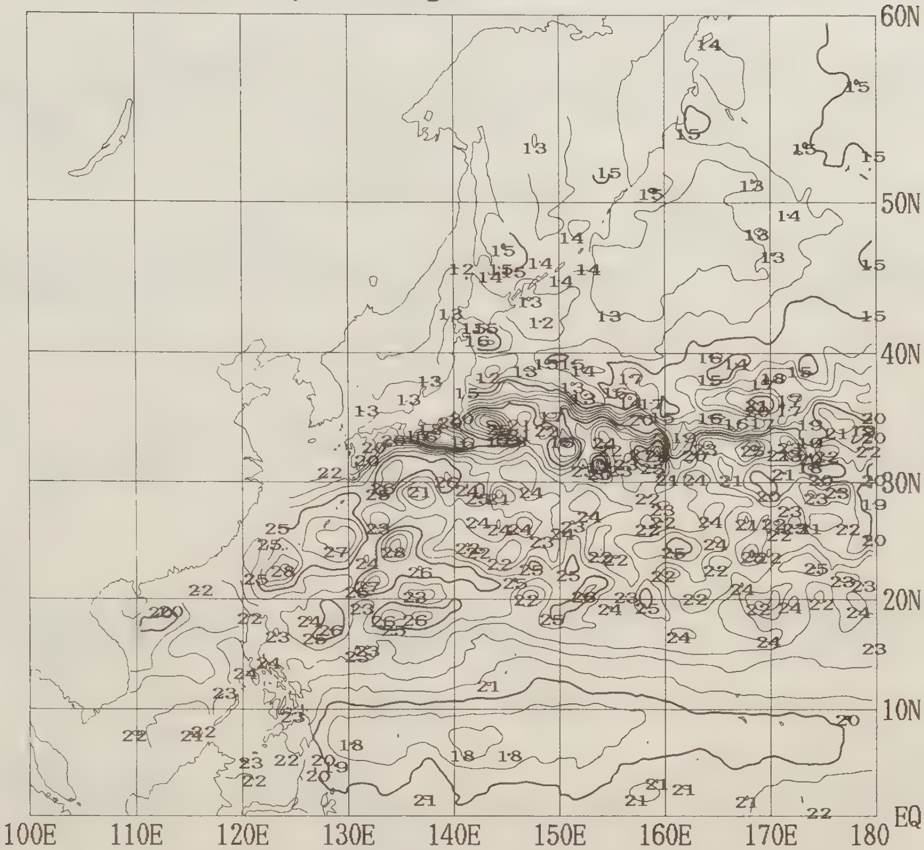
Fig.8 Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in JUN 1997. Small arrows indicate sea surface currents measured with acoustic Doppler current profilers, GEKs deployed in research vessels, and ship drift by merchant ships/drifting buoys during the month. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.



第9図 旬別黒潮流軸図

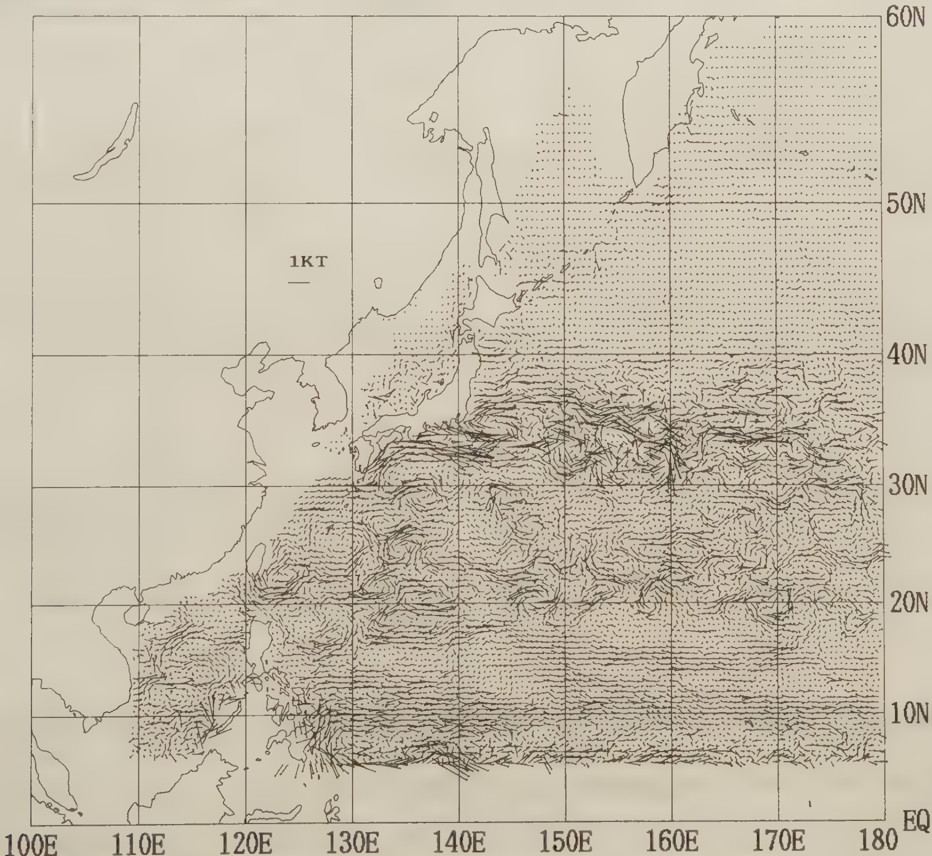
Fig.9 Time series of the Kuroshio axis

Sea surface dynamic heights and current distribution



第10図 北西太平洋海面力学高度分布図(1997年 6月11日)

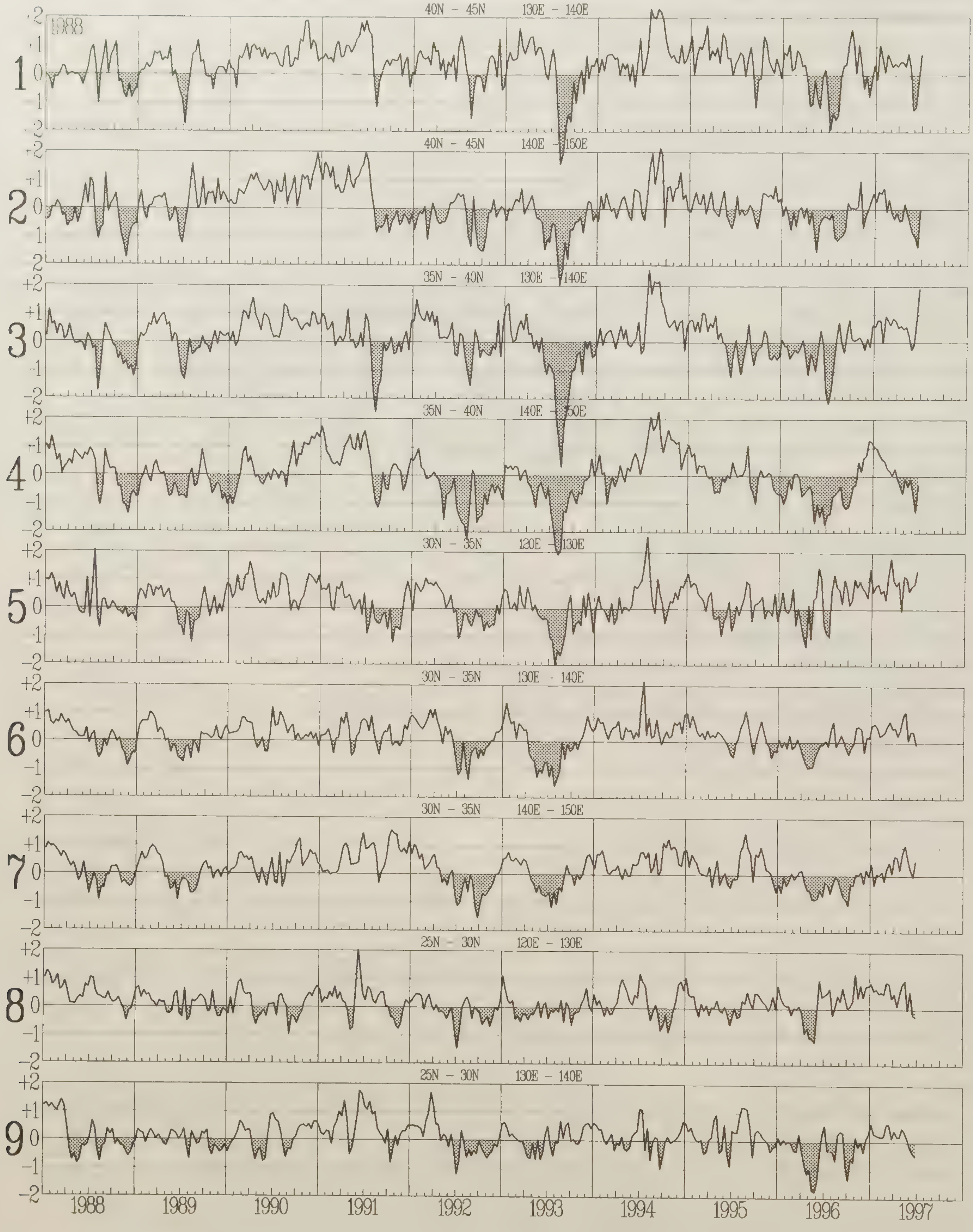
Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (JUN 11,1997).
1500db surface is assumed to be no current surface.



第11図 北西太平洋海流ベクトル図(1997年 6月11日)

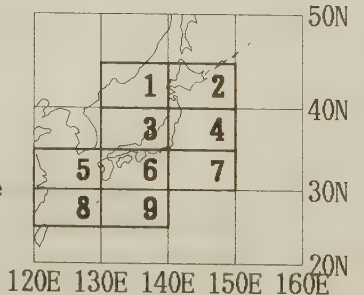
Fig.11 Sea surface current vectors in the western North Pacific (JUN 11,1997).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and sub-surface temperature distribution assuming the geostrophic relation.

Time Series of Area Mean SST in the Western North Pacific

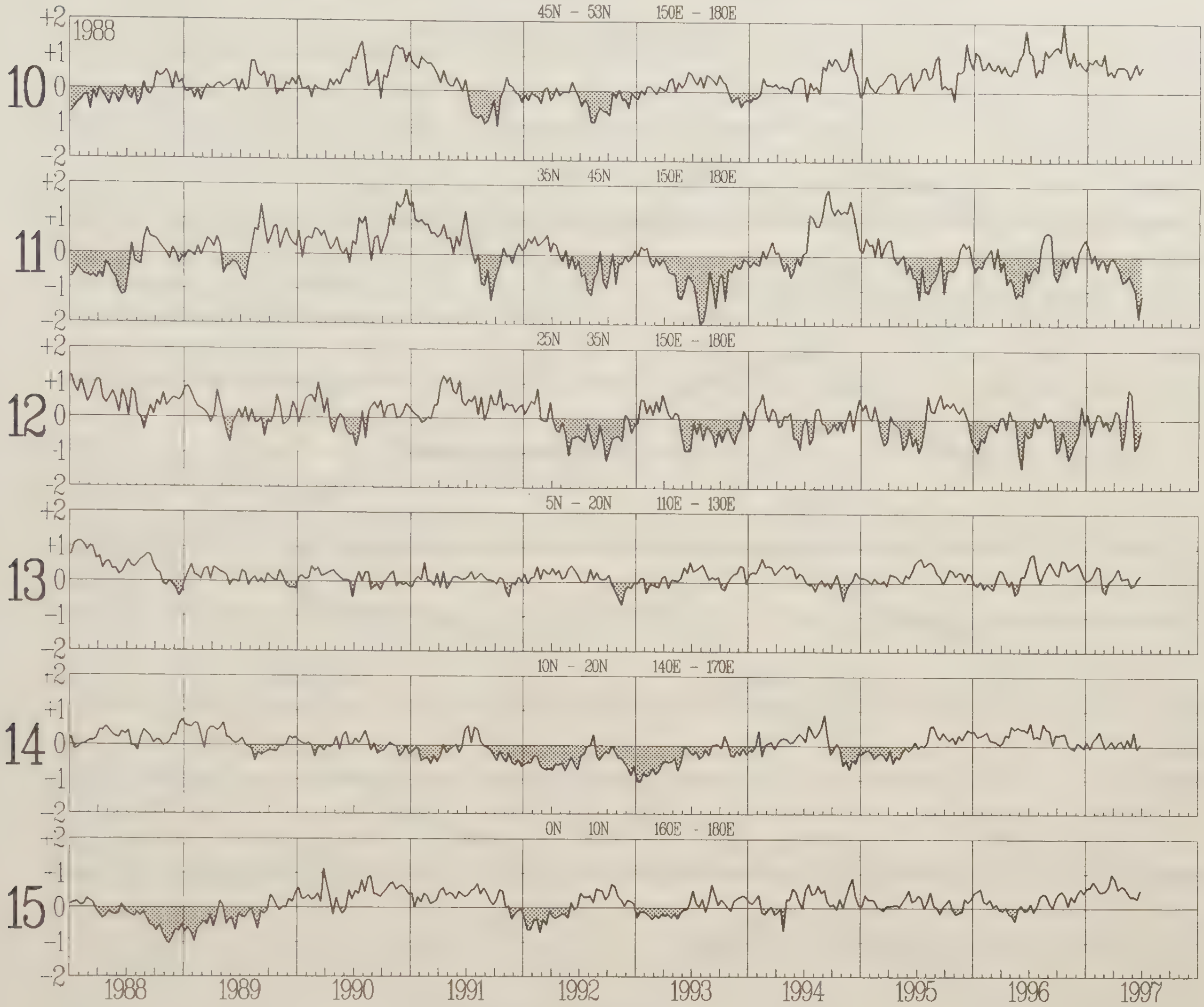


第12図　海域別旬平均海面水温平年偏差時系列図

Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right figure. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

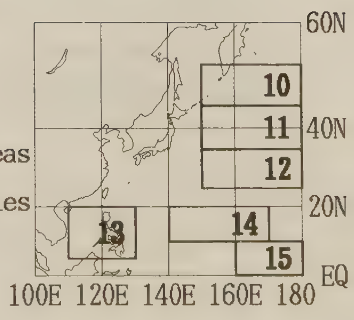


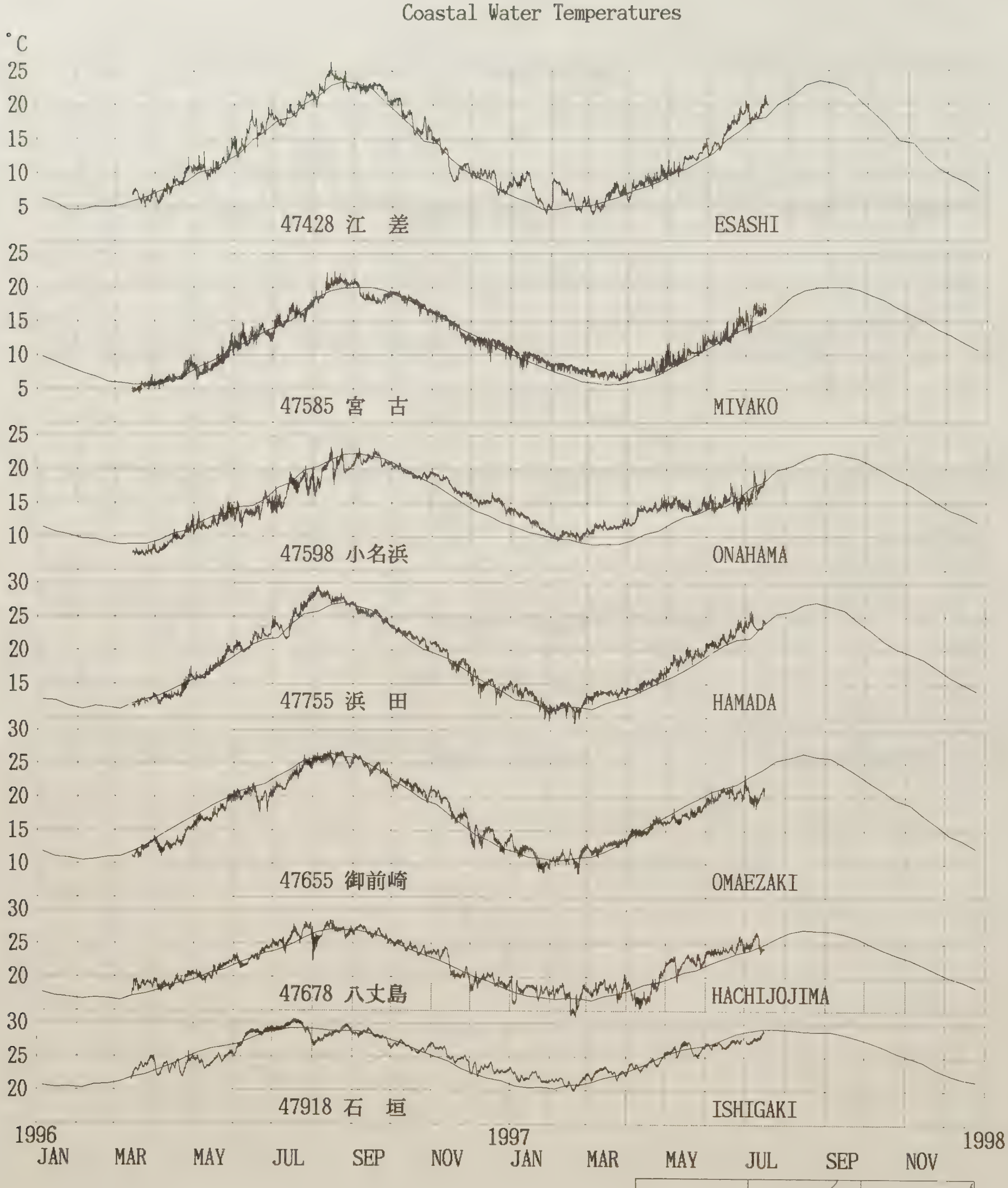
Time Series of Area Mean SST in the Western North Pacific



第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

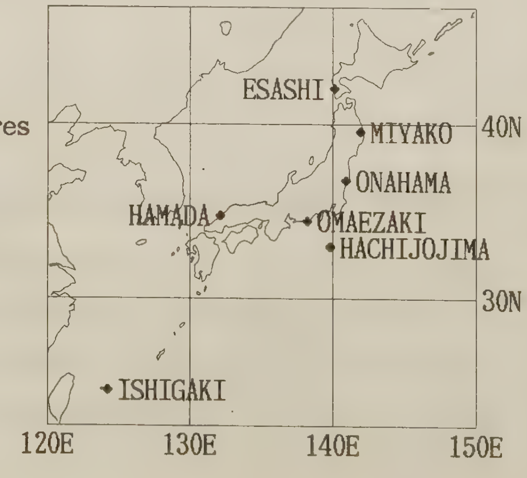
Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right figure. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).



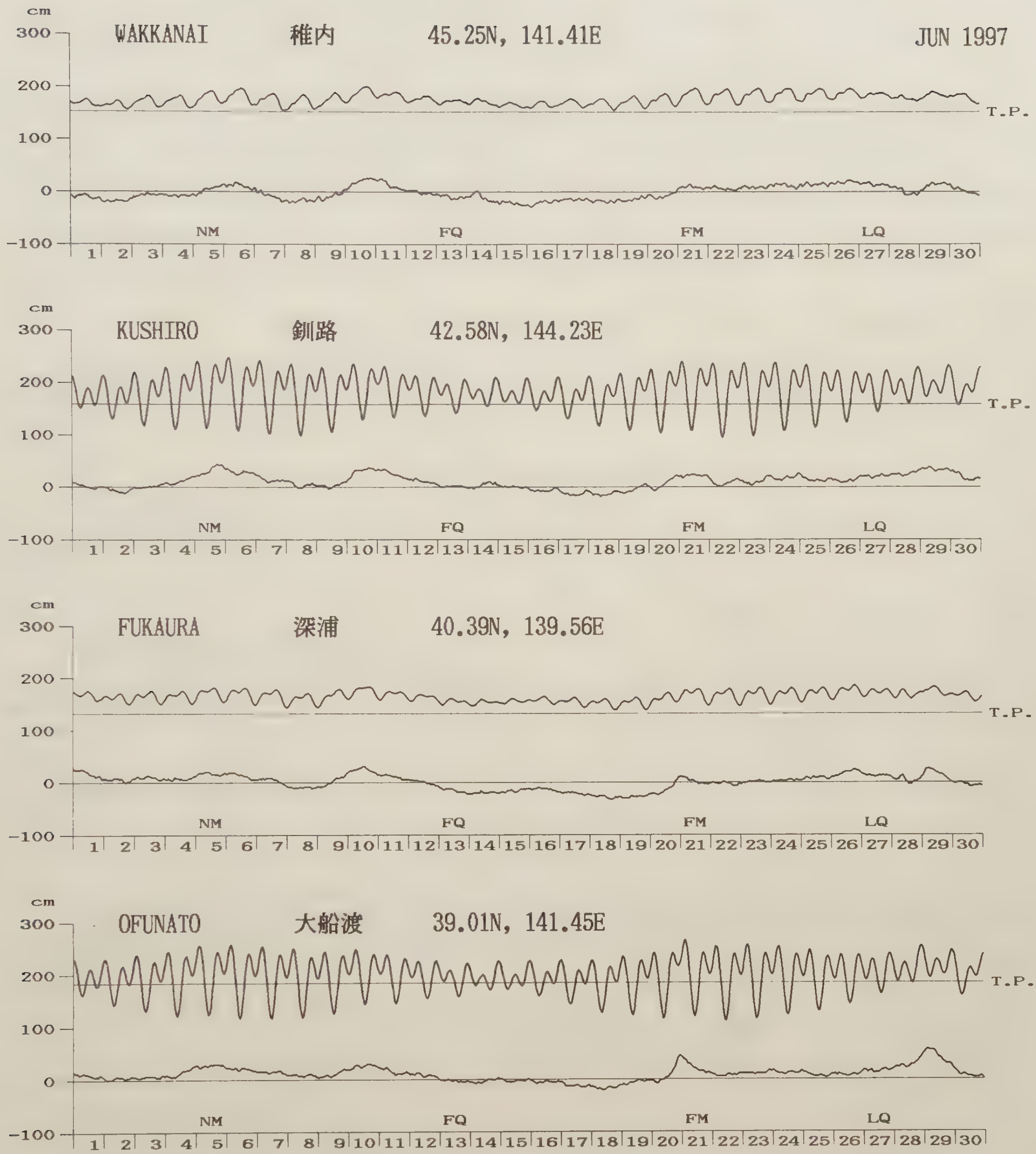


第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show 10-day mean climatology.

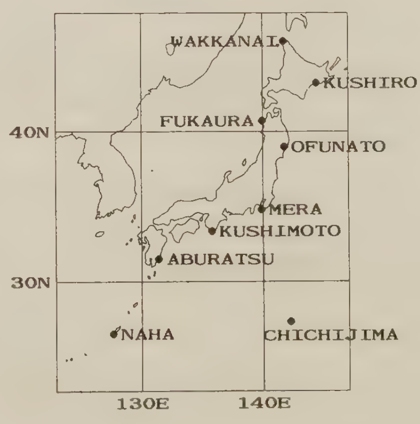


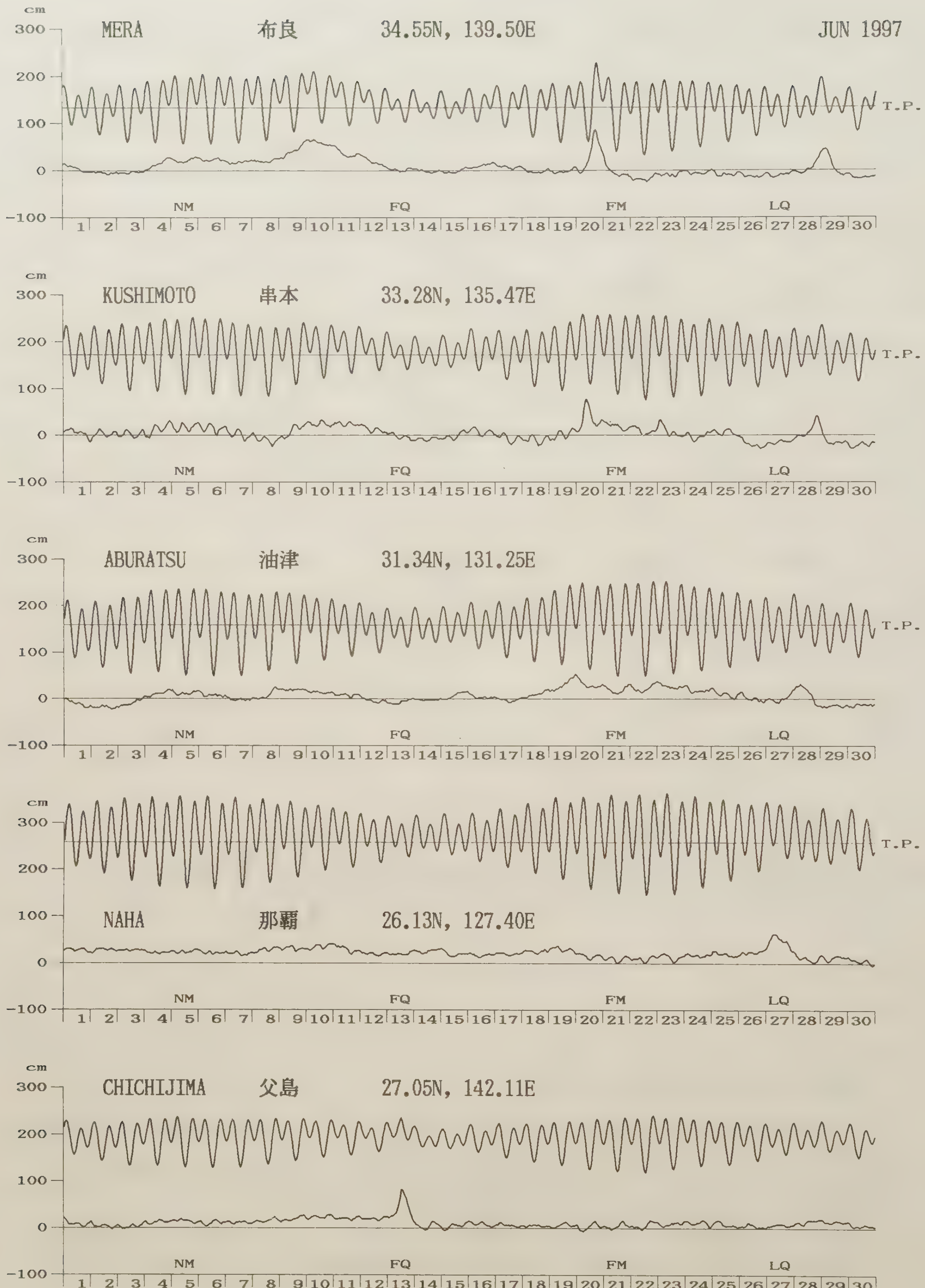
Time Series of Sea Level



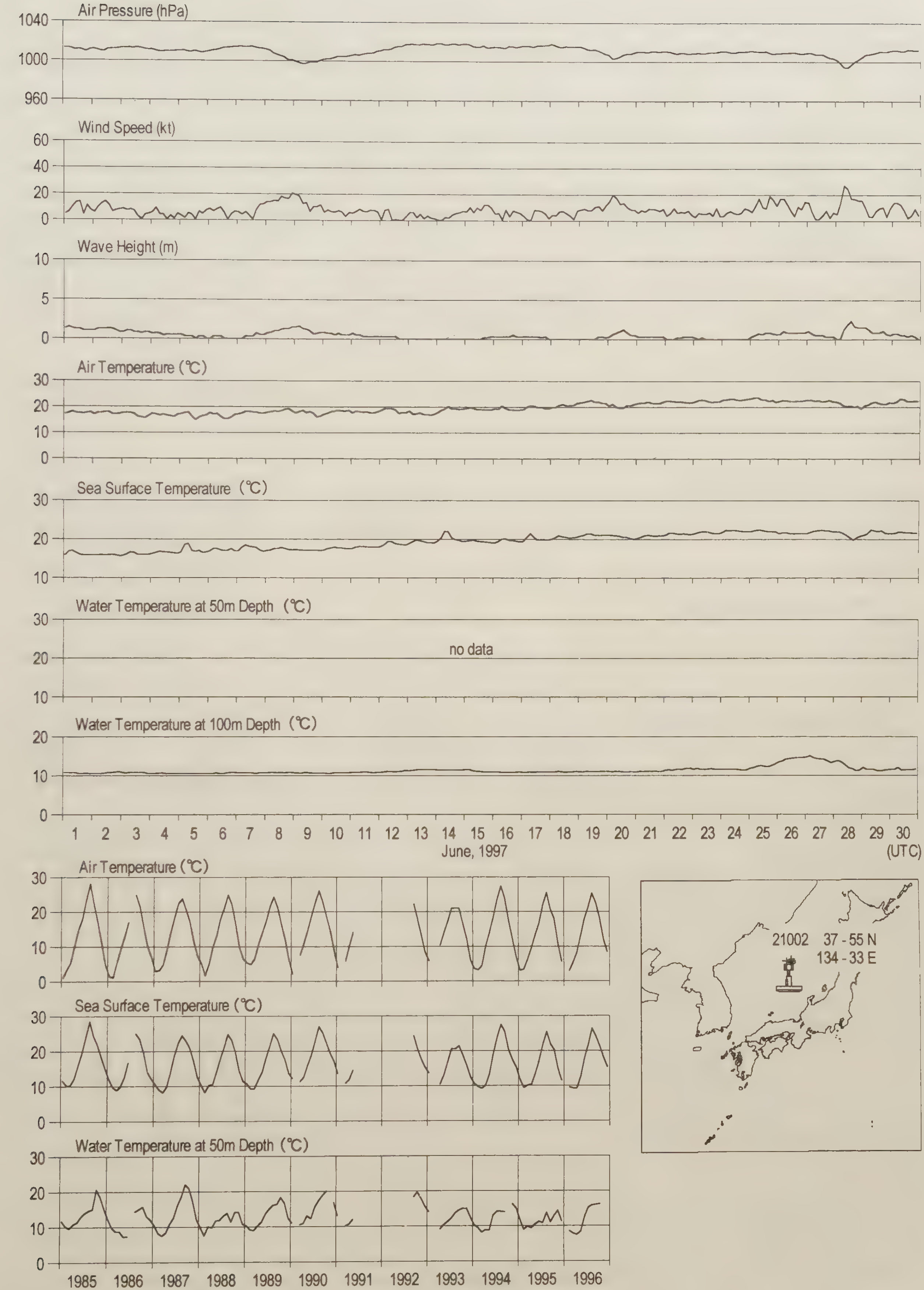
第14図 沿岸潮位時系列図 (1997年 6月)

Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.
Sea level anomalies are two times values of the differences between the observations and the predicted astronominal tide.
FM: full moon, FQ: first quarter
NM: new moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



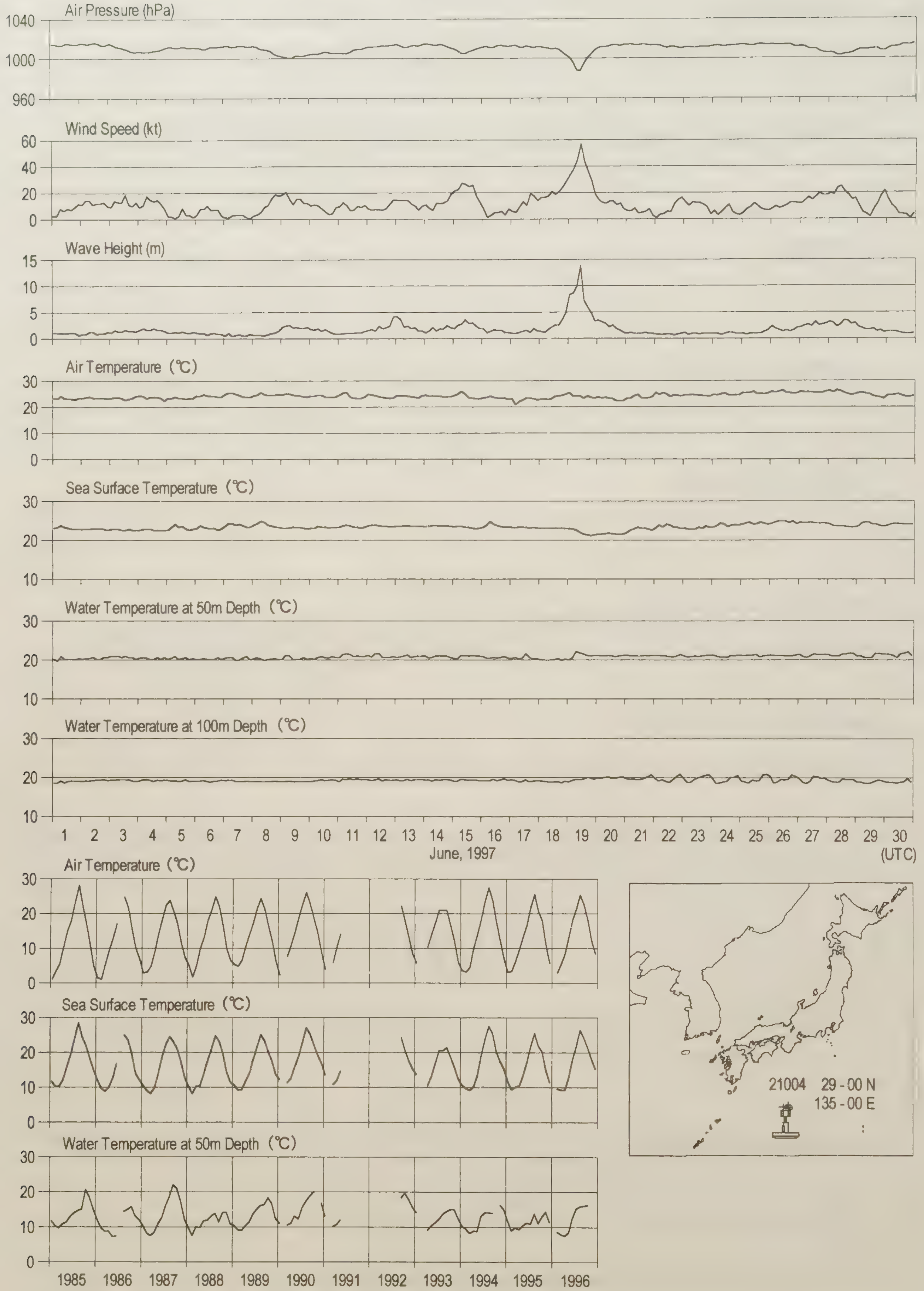


第14図 つづき
Fig.14 continue



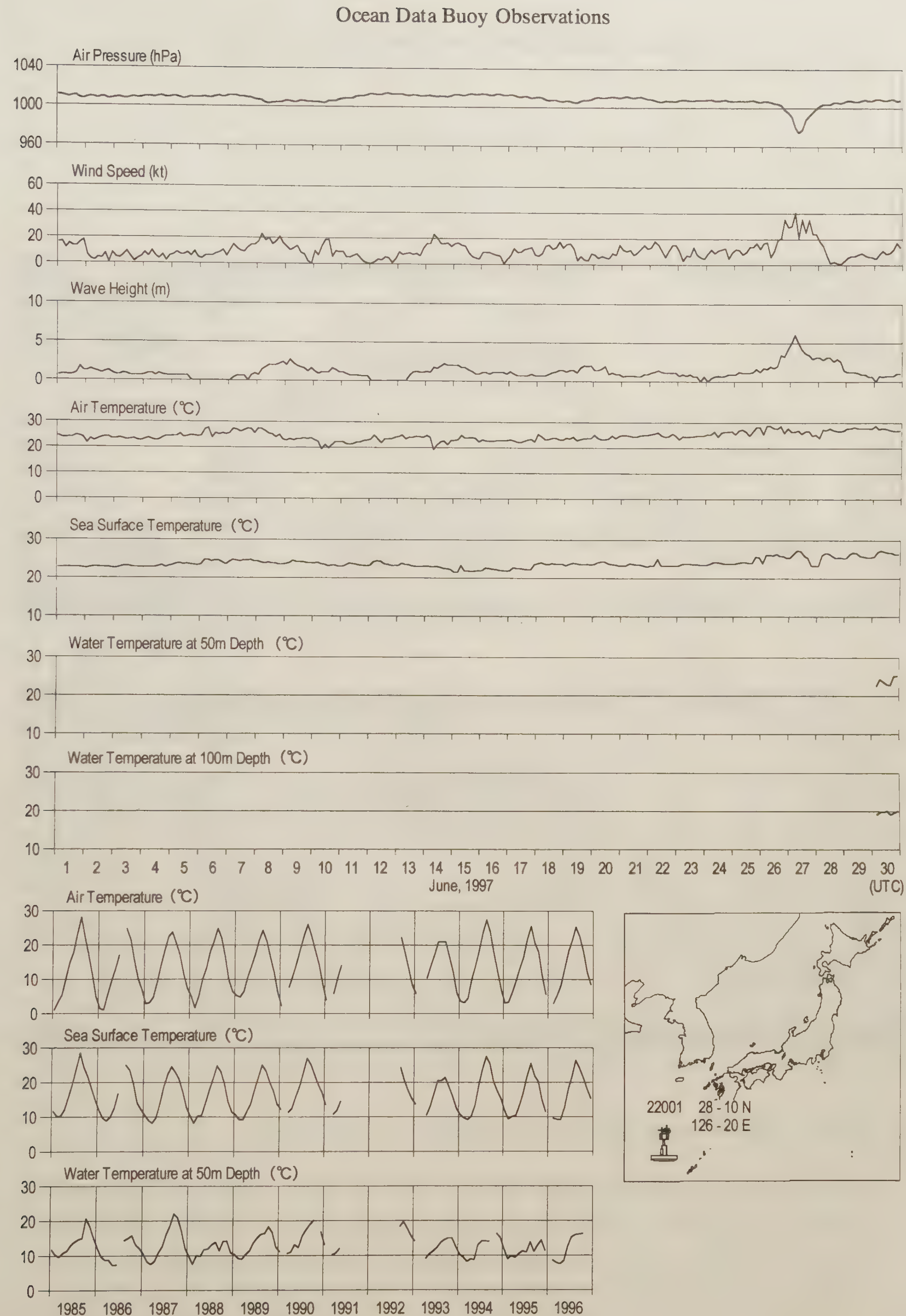
第15図　海洋気象ブイロボットによる観測の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



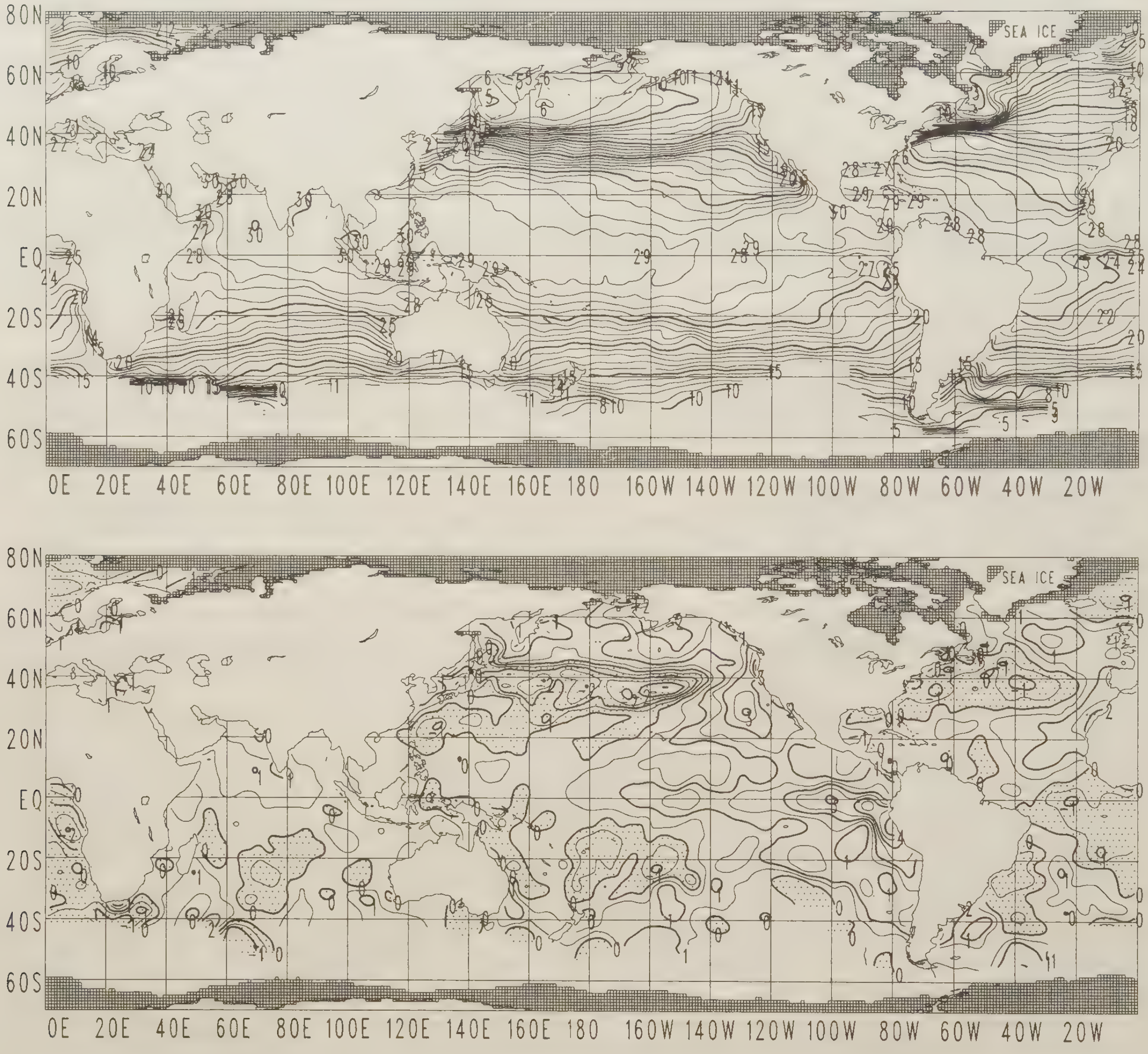
第15図　海洋気象ブイロボットによる観測の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



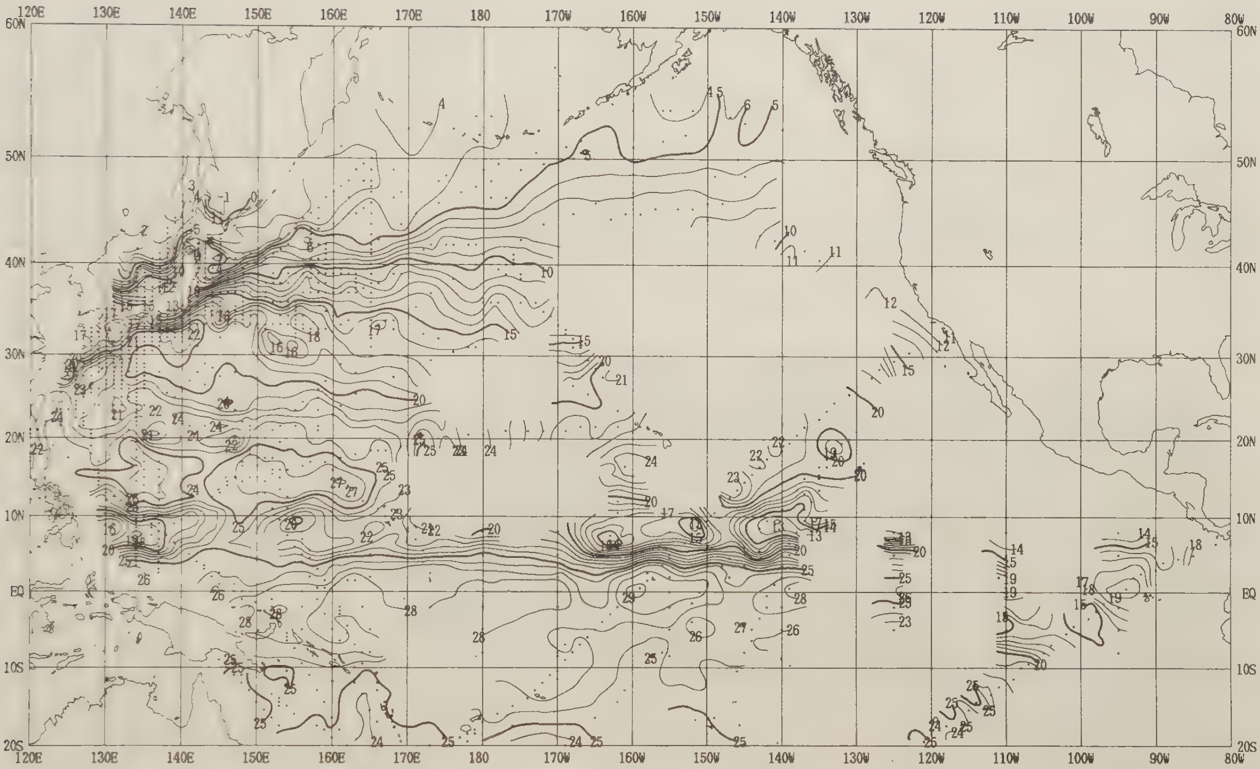
第15図　海洋気象ブイロボットによる観測の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



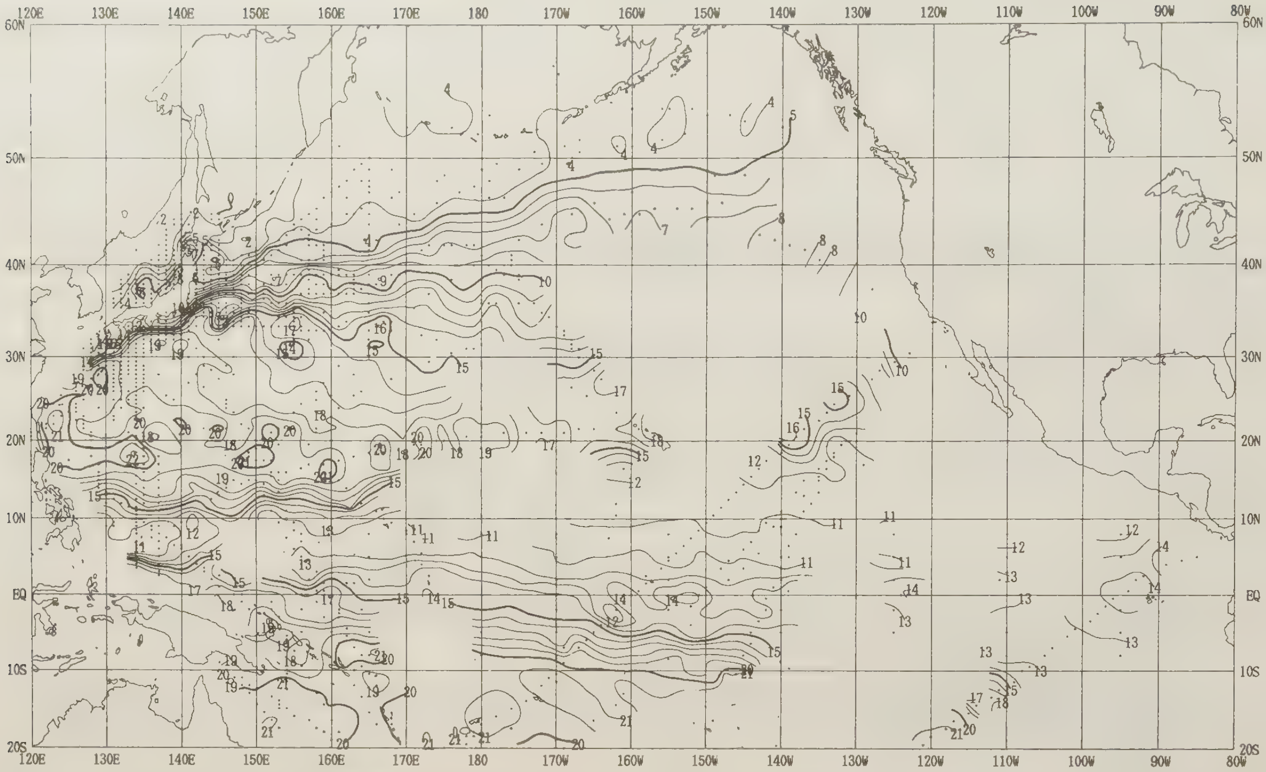
第16図　全球月平均海面水温図（上）及び偏差図（下）（1997年 6月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for JUN 1997. Anomalies are computed from the JMA climatology (1961-1990) (Marine Department of JMA, 1991, Climatic charts of sea surface temperatures of the western North Pacific and the global ocean). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown as thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



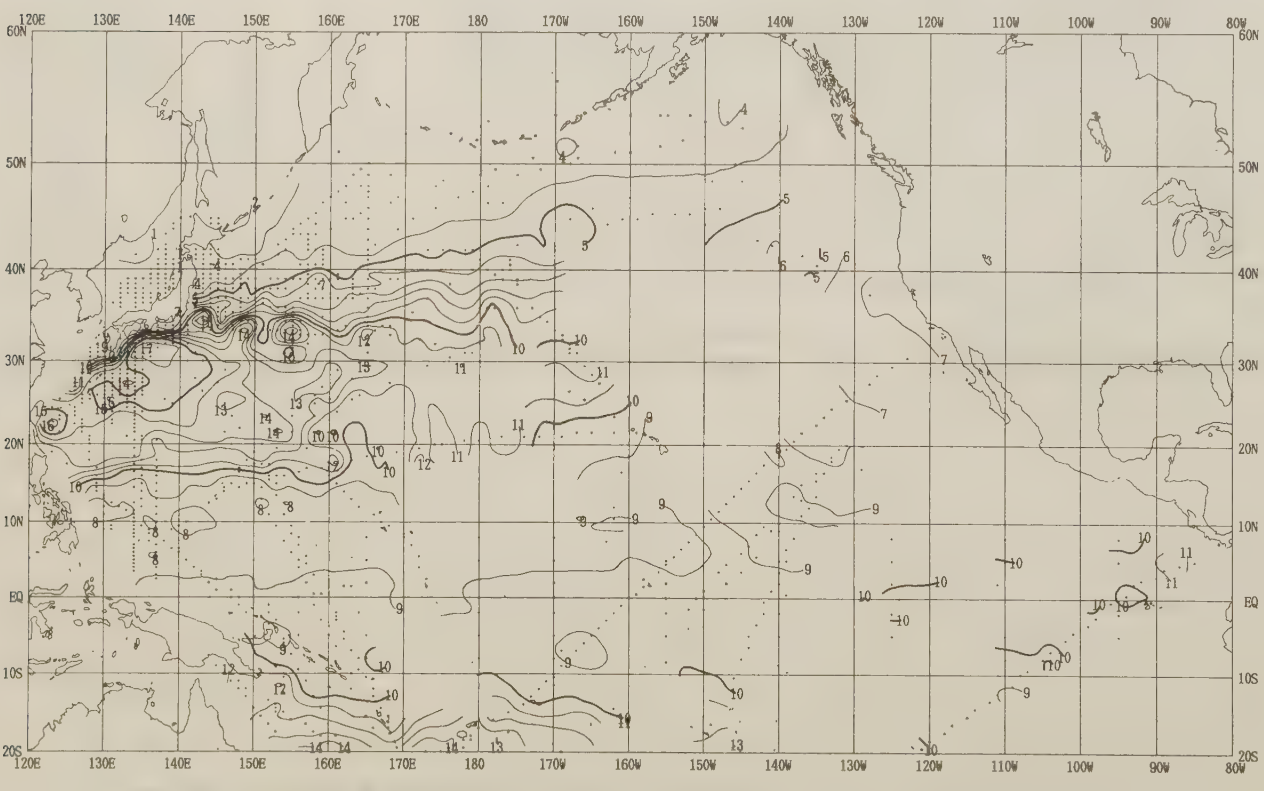
第17図　太平洋表層水温(深さ100m)図 (1997年 6月)

Fig.17 Subsurface (100m) temperatures in the Pacific Ocean for JUN 1997. Contour interval is 1°C. Observation points are denoted by dots.



第18図　太平洋表層水温(深さ200m)図 (1997年 6月)

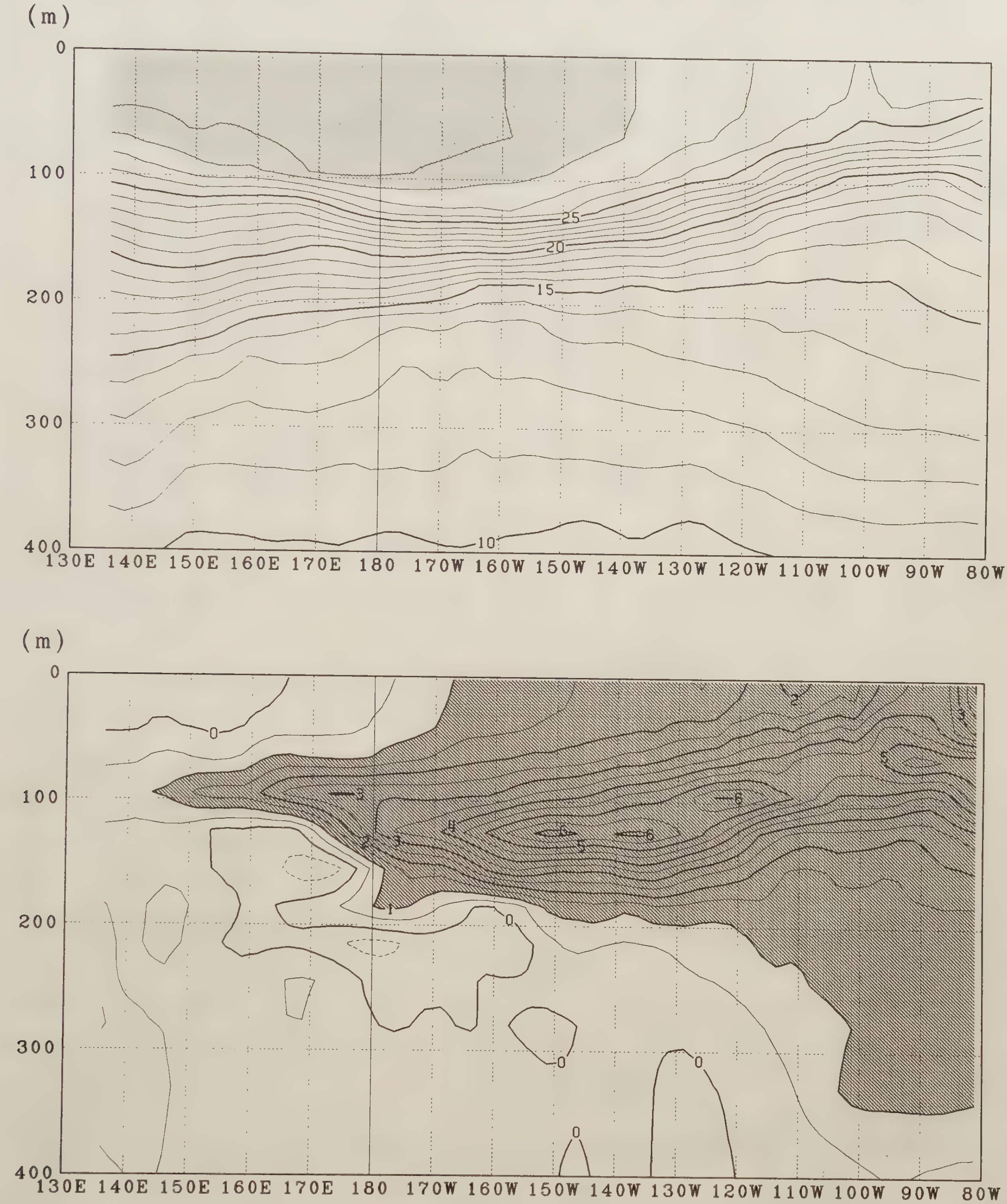
Fig.18 Subsurface (200m) temperatures in the Pacific Ocean for JUN 1997.
Contour interval is 1°C. Observation points are denoted by dots.



第19図　太平洋表層水温(深さ400m)図 (1997年 6月)

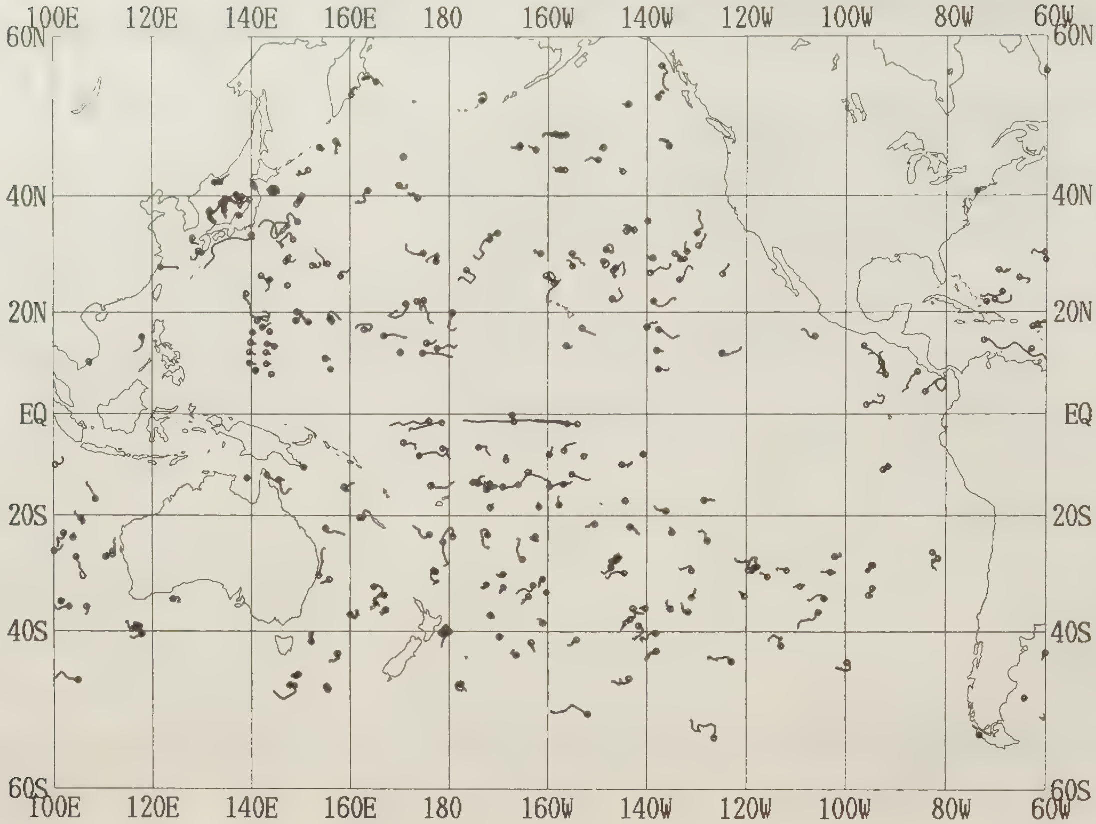
Fig.19 Subsurface (400m) temperatures in the Pacific Ocean for JUN 1997.
Contour interval is 1°C. Observation points are denoted by dots.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



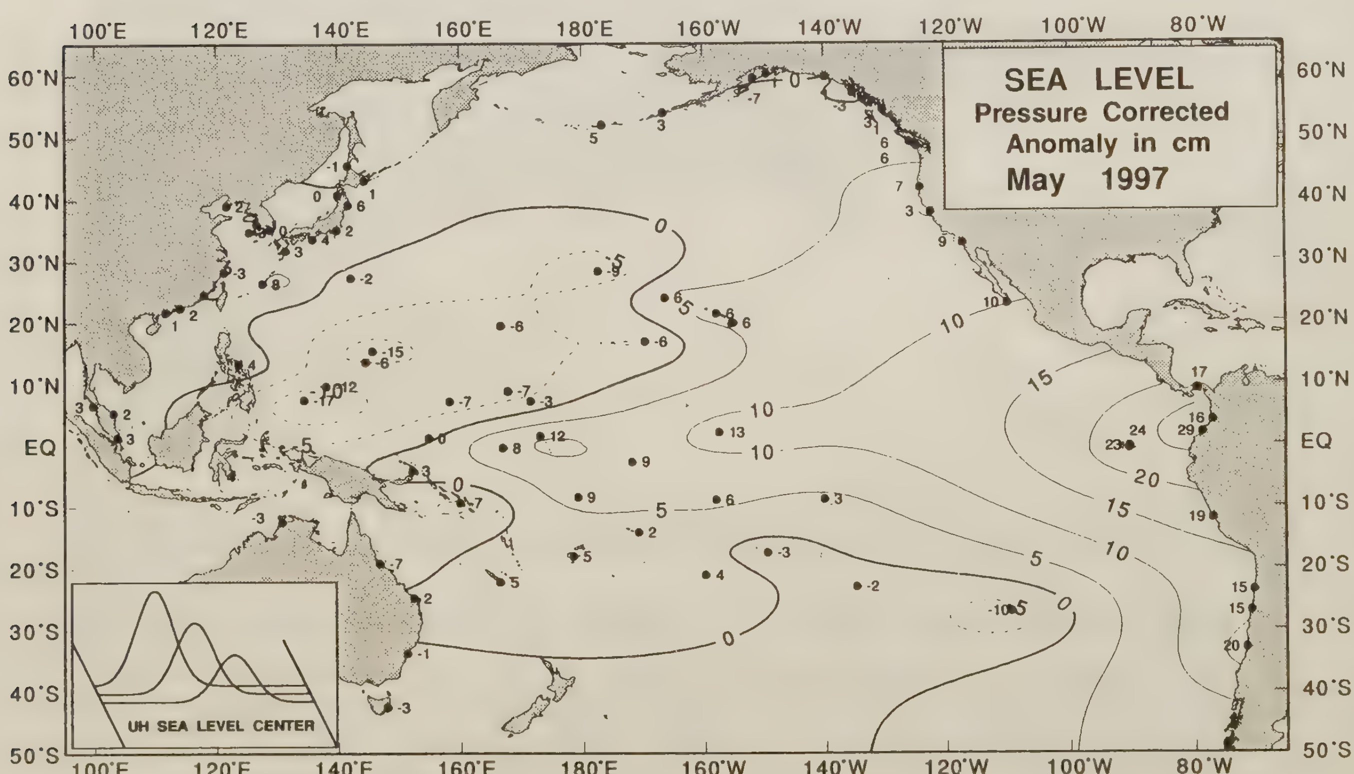
第20図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1997年 6月）

Fig.20 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for JUN 1997. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in top panel are shaded. In bottom panel values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1995 base period means.



第21図　太平洋ブイ流跡図(1997年 6月)

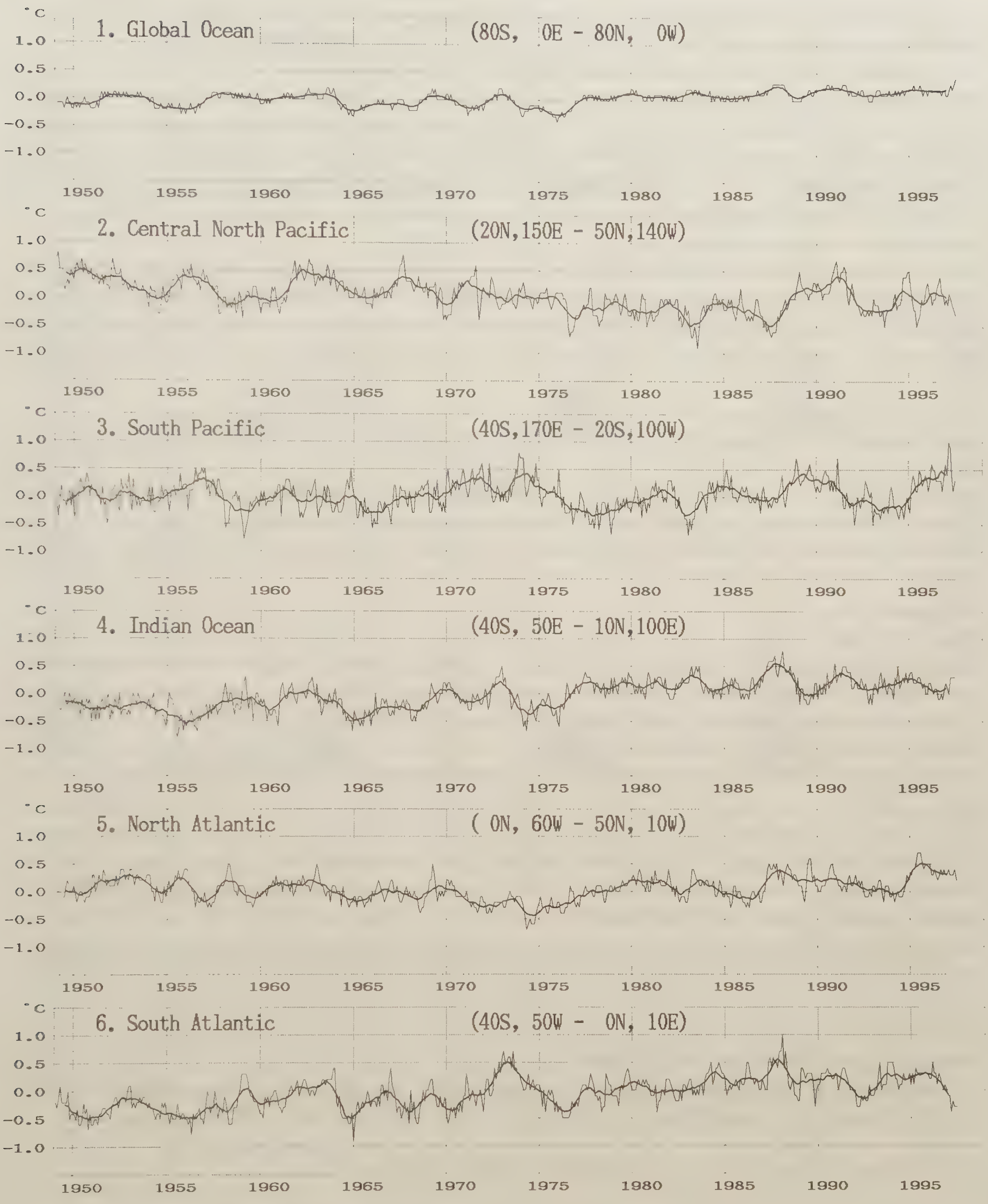
Fig.21 Movements of drifting buoys in the Pacific Ocean during JUN 1997.
Each track is for one buoy. Small circles represent last positions for the month.

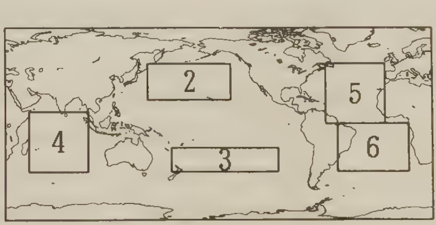


第22図　太平洋海面水位偏差図 (1997年 5月)

Fig.22 Monthly sea level anomalies for MAY 1997 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Dept. of Oceanography, Univ. of Hawaii.

Long-term Variation of Monthly Mean SST Anomalies

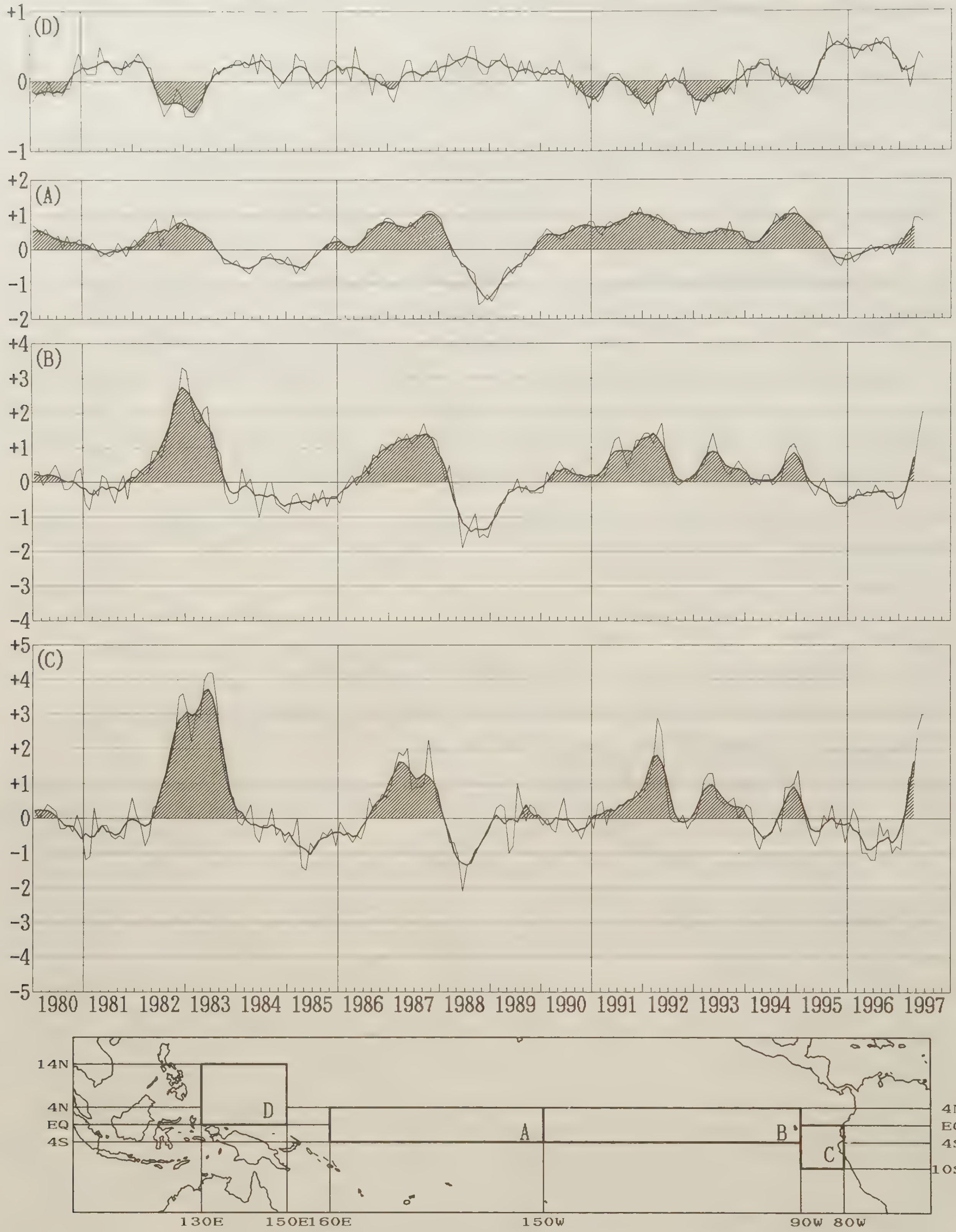




第23図 海域平均海面水温偏差の長期変動

Fig.23 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.

Time Series of Equatorial Pacific SST Anomalies



第24図　太平洋赤道域の海面水温偏差時系列図

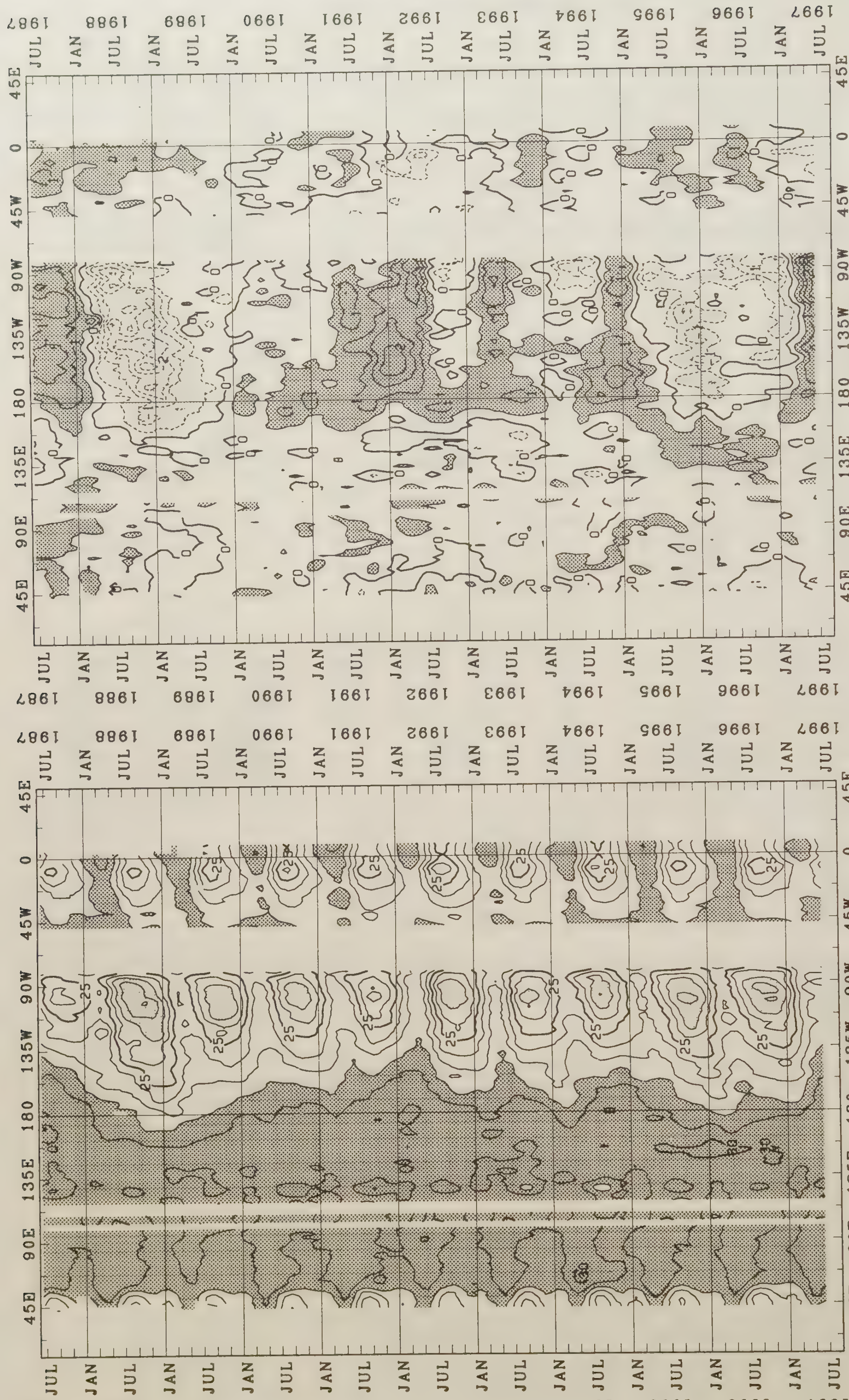
Fig.24 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom.
Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

MONTH	SEA SURFACE TEMPERATURE AND ANOMALY (°C)								SOI	SEA LEVEL PRESSURE ANOMALY (hPa)	
	REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 95	28.3	-0.2	29.0	1.0	26.2	0.8	25.7	1.4	-0.4	-0.3	0.6
FEB 95	28.2	-0.1	28.9	0.9	26.8	0.6	26.1	0.4	-0.2	0.6	1.1
MAR 95	28.2	-0.2	28.8	0.7	26.9	0.0	25.8	-0.1	0.4	0.3	-0.5
APR 95	28.7	-0.1	28.8	0.6	26.9	-0.2	24.6	-0.5	-1.4	-1.6	-0.0
MAY 95	29.2	0.1	29.0	0.5	26.2	-0.4	23.1	-0.8	-1.0	-0.7	0.6
JUN 95	29.6	0.3	29.0	0.5	26.0	-0.1	22.2	-0.5	-0.1	0.3	0.4
JUL 95	29.5	0.3	28.7	0.2	25.3	0.1	21.7	0.1	0.4	0.4	-0.4
AUG 95	29.8	0.7	28.4	0.0	24.3	-0.3	20.5	-0.1	0.0	0.4	0.3
SEP 95	29.7	0.5	28.1	-0.2	24.0	-0.6	20.7	0.4	0.2	0.4	-0.0
OCT 95	29.8	0.5	28.0	-0.4	23.9	-0.7	20.4	-0.3	-0.3	-0.7	-0.5
NOV 95	29.7	0.5	27.9	-0.5	23.9	-0.7	21.5	0.0	0.1	0.1	-0.1
DEC 95	29.5	0.6	28.0	-0.2	24.2	-0.7	21.9	-0.7	-0.5	-0.9	0.0
JAN 96	29.0	0.5	27.9	-0.1	25.0	-0.4	24.1	-0.2	0.8	1.0	-0.7
FEB 96	28.6	0.3	27.6	-0.4	25.7	-0.5	26.0	0.3	0.1	-0.2	-0.5
MAR 96	28.8	0.4	27.8	-0.3	26.7	-0.2	25.9	0.0	0.7	1.0	-0.3
APR 96	29.3	0.5	28.1	-0.1	26.7	-0.4	24.1	-1.0	0.8	0.5	-0.5
MAY 96	29.6	0.5	28.5	0.0	26.2	-0.4	22.9	-1.0	0.3	1.2	1.2
JUN 96	29.7	0.4	28.6	0.1	25.7	-0.4	21.5	-1.2	1.4	1.6	-0.2
JUL 96	29.8	0.6	28.4	-0.1	25.1	-0.1	20.4	-1.2	0.7	0.6	-0.6
AUG 96	29.6	0.5	28.4	0.0	24.3	-0.3	20.5	-0.1	0.4	0.4	-0.3
SEP 96	29.8	0.6	28.4	0.1	24.3	-0.3	19.8	-0.5	0.5	-0.7	-1.7
OCT 96	29.9	0.6	28.5	0.1	24.3	-0.3	20.4	-0.3	0.4	-0.1	-0.8
NOV 96	29.5	0.3	28.2	-0.2	24.3	-0.3	20.5	-1.0	-0.0	-0.5	-0.5
DEC 96	29.2	0.3	28.3	0.1	24.1	-0.8	21.8	-0.8	0.8	-0.3	-1.9
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1

第1表　エルニーニョ監視指数

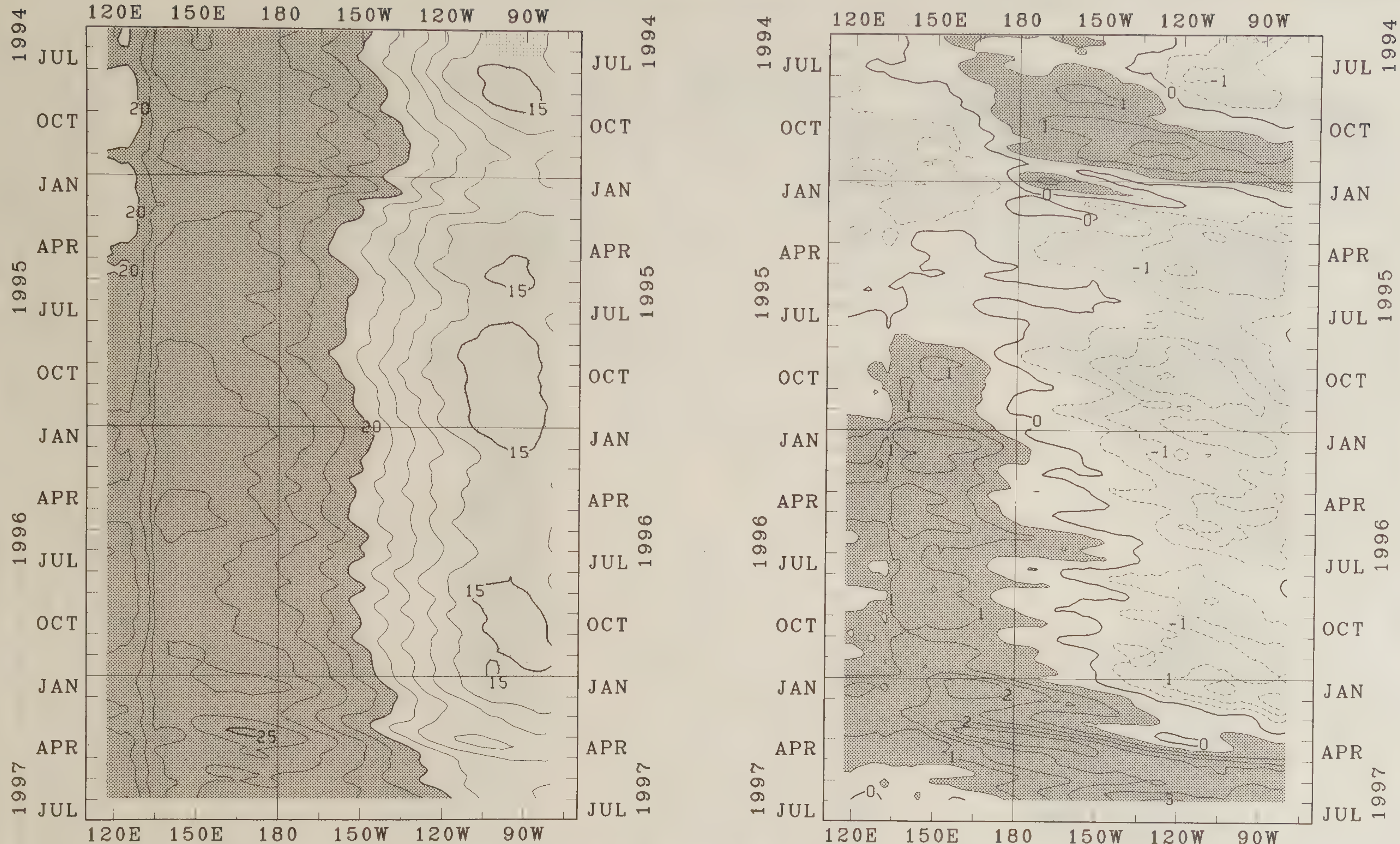
Table 1 El Nino Monitoring indices



第25図　赤道に沿った海面水温（左）および偏差（右）の時間-経度断面図

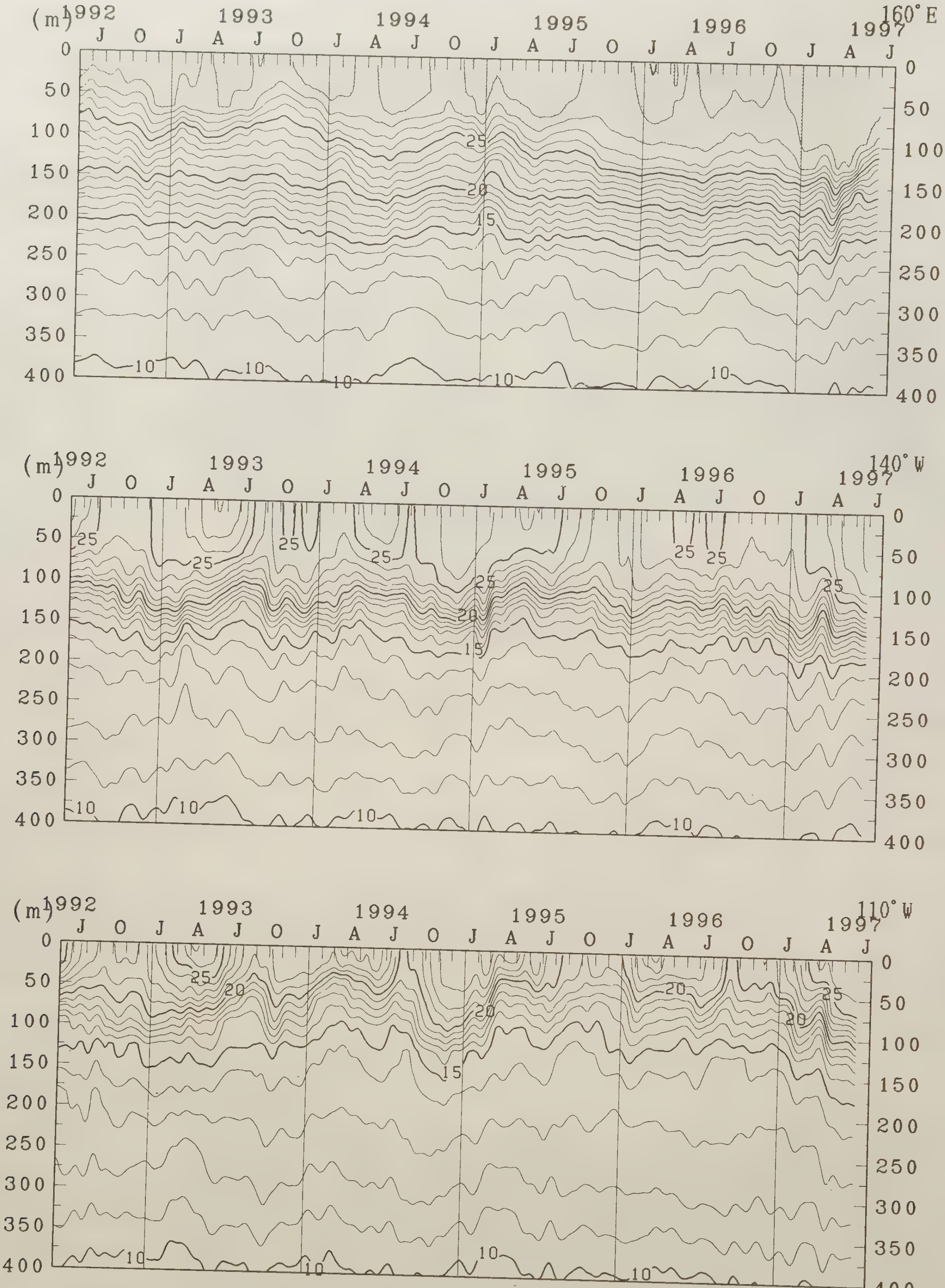
Fig.25 Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2 °N-2 °S) in the global ocean. Contour interval is 1 °C (left) and 0.5 °C (right). Values in the left panel greater than 28 °C are shaded and values less than 23 °C are spotted. Dashed contours in right panel indicate negative anomalies. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第26図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

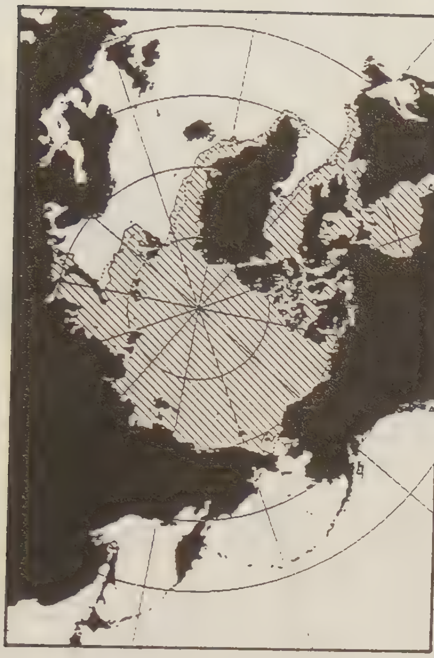
Fig.26 Time-longitude sections of ocean heat content in the upper 260m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values in the left panel greater than 20°C are shaded and values less than 16°C are spotted. Dashed contours in right panel indicate negative anomalies. Anomalies are computed from 1987-1995 base period means.



第27図　太平洋赤道域の表層水温の時間－深度断面図

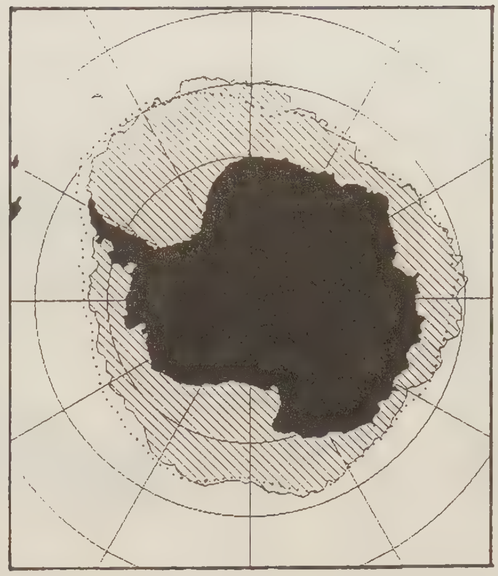
(上：西部、中：中部、下：東部)

Fig.27 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.



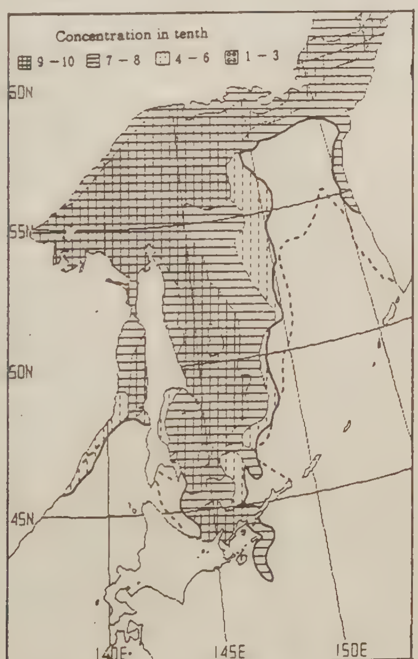
第28-1図　北極域の海氷図（1997年 6月12日）

Fig. 28-1　Sea ice chart in the Arctic on 12 JUNE 1997. The area hatched represents the sea ice extent.　The dotted line denotes the mean ice edge (averaged for the period from 1972 through 1990).　The data source is the U.S. National Ice Center (USA).



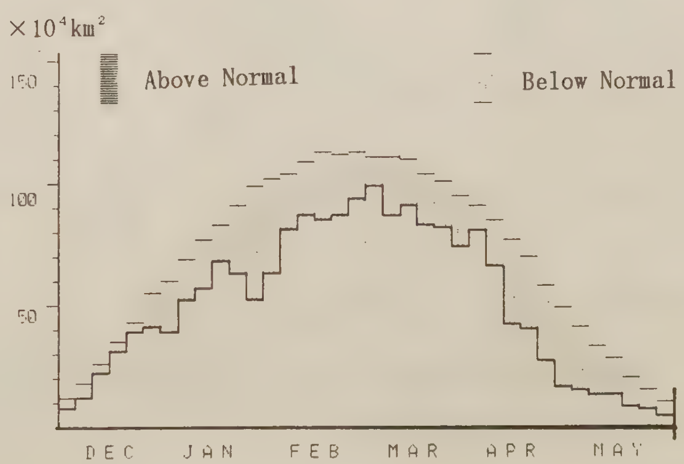
第28-2図　南極域の海氷図（1997年 6月12日）

Fig. 28-2　Sea ice chart in the Antarctic on 12 JUNE 1997. The area hatched represents the sea ice extent.　The dotted line denotes the mean ice edge (averaged for the period from 1972 through 1990).　The data source is the U.S. National Ice Center (USA).



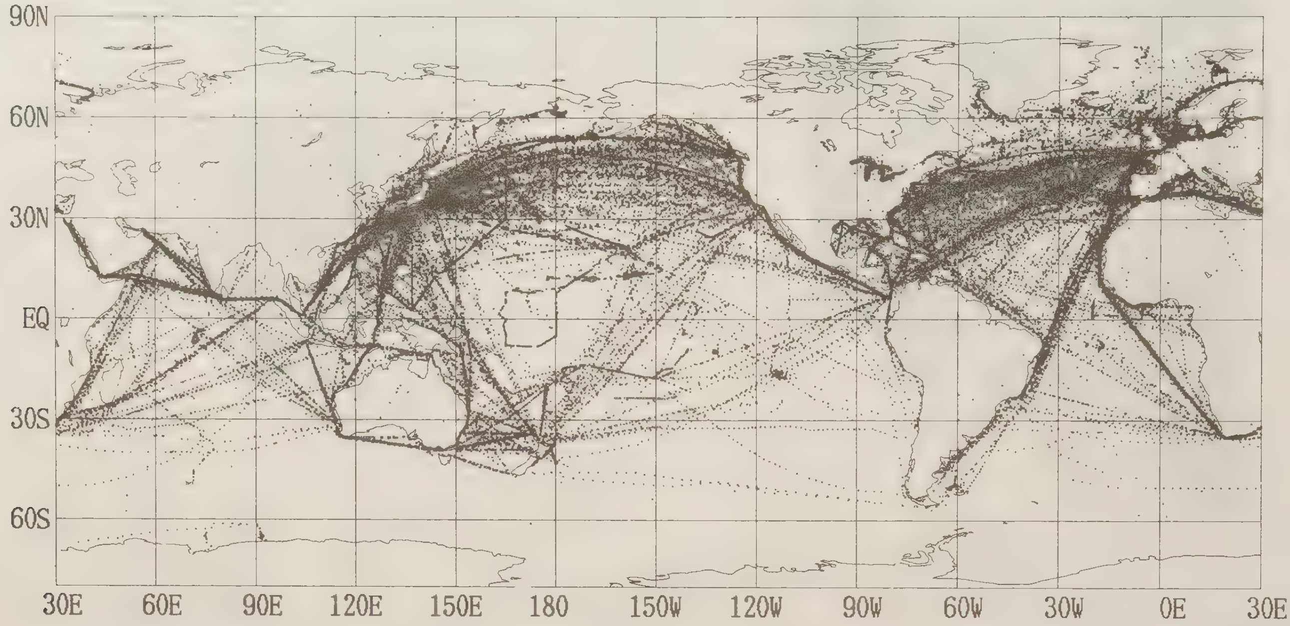
第28-3図　オホーツク海の最大海氷域面積図（1997年 3月5日）

Fig. 28-3　Sea ice chart in the Sea of Okhotsk on 5 MARCH 1997, when the largest sea ice extent was recorded in the season. The dotted line denotes the mean ice edge (averaged for the period from 1972 through 1990).

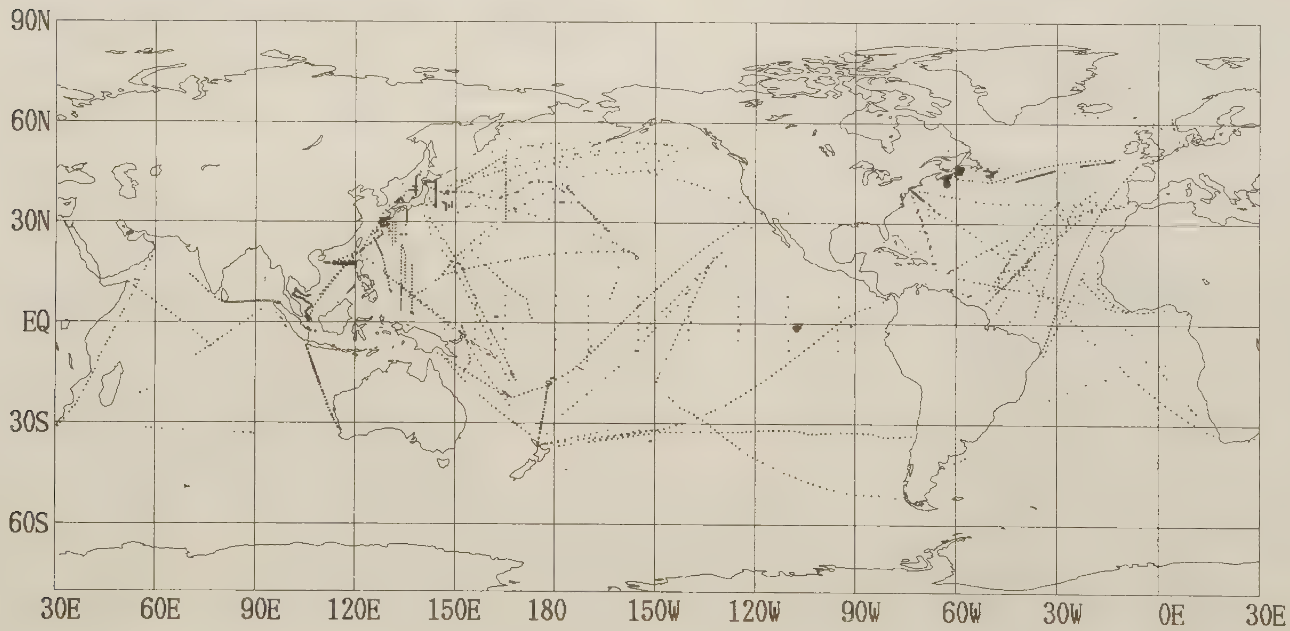


第28-4図　オホーツク海半旬海氷域面積（1996/97）

Fig. 28-4　Time-series of 5-day sea ice extent in the Sea of Okhotsk (1996/97).



SHIP messages　　Total data:115368

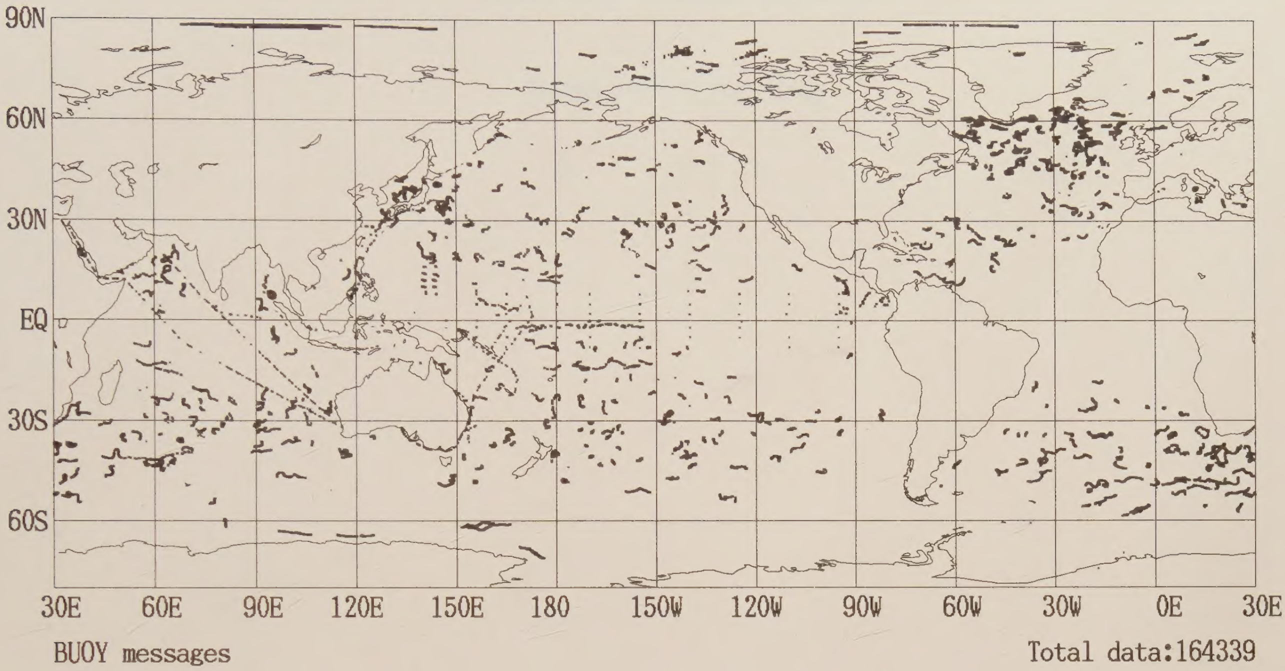


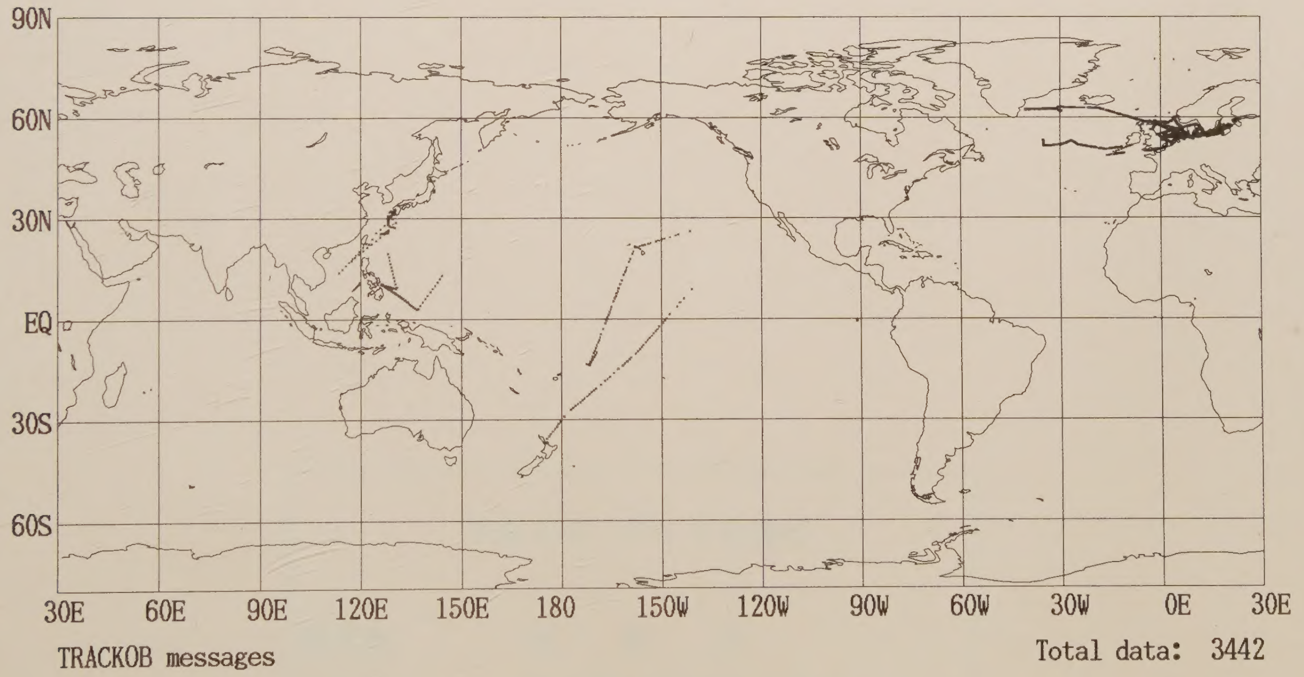
BATHY/TESAC messages　　Total data: 4607

第29-1図　測点分布図(1997年 6月)

Fig.29-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for JUN 1997.

Geographical Distribution of Oceanographic Data





第29-2図　測点分布図(1997年 6月)

Fig.29-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for JUN 1997.

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